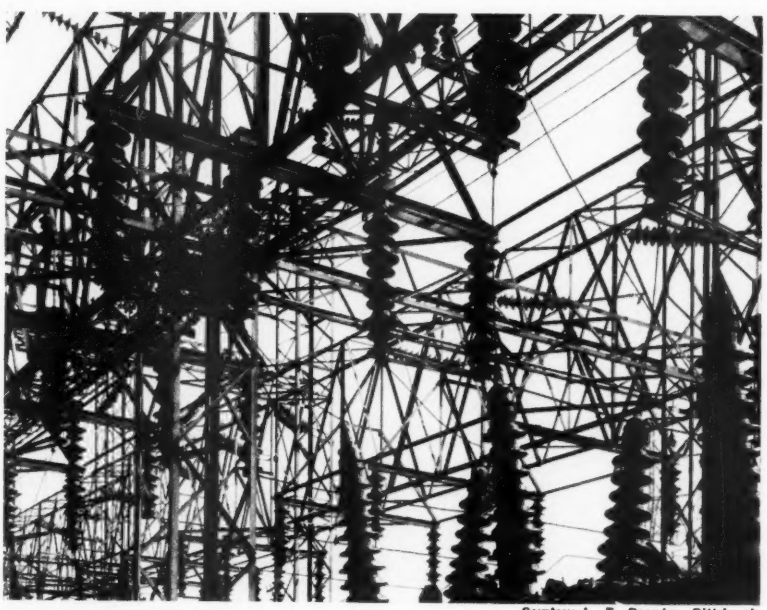
EDISON ELECTRIC INSTITUTE BULLETIN



Courtesy L. F. Beaudry, Pittsburgh

VOLUME 1 OCTOBER 1933 NUMBER 7

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry

DURING THE MONTH OF AUGUST

	1933	1932	%
Kilowatt-hours Generated* (net)			
By fuel	4,503,222,000	3,918,009,000	+14.9
By water power	2,570,881,000	2,319,220,000	+10.9
Total kilowatt-hours generated	7,074,103,000	6,237,229,000	+13.4
Additions to Supply			
Energy purchased from other sources	236,359,000	197,360,000	+19.8
Net international imports	57,870,000	34,451,000	+68.0
Total	294,229,000	231,811,000	+26.9
Deductions from Supply			
Energy used in electric railway depts.	50,312,000	59,732,000	−15.8
Energy used in electric and other depts.	99,342,000	98,641,000	+ 0.7
Total	149,654,000	158,373,000	− 5.5
Total energy for distribution	**7,218,678,000**	**6,310,667,000**	**+14.4**
Energy lost in transmission, distribution, etc.	1,346,827,000	1,265,504,000	+ 6.4
Kilowatt-hours sold to ultimate consumers	**5,871,851,000**	**5,045,163,000**	**+16.4**
Sales to Ultimate Consumers (kw-hrs)			
Domestic Service	863,679,000	838,463,000	+ 3.0
Commercial—Small light and power (retail)	1,014,104,000	1,015,998,000	− 0.2
Commercial—Large light and power (wholesale)	3,400,587,000	2,616,698,000	+30.0
Municipal street lighting	166,195,000	174,706,000	− 4.9
Railroads—Street and Interurban	309,232,000	310,580,000	− 0.4
Railroads—Electrified Steam	55,654,000	41,782,000	+33.2
Municipal and miscellaneous	62,400,000	46,936,000	+37.2
Total sales to ultimate consumers	5,871,851,000	5,045,163,000	+16.4
Total revenue from ultimate consumers	$143,441,700	$140,255,500	+ 2.3

DURING TWELVE MONTHS ENDING AUGUST 31st

Kilowatt-hours Generated* (net)			
By fuel	45,783,393,000	50,150,702,000	− 8.7
By water power	31,624,803,000	29,417,188,000	+ 7.5
Total kilowatt-hours generated	77,408,196,000	79,567,890,000	− 2.7
Purchased energy (net)	2,769,767,000	2,641,171,000	+ 4.9
Energy used in electric railway and other depts.	1,937,437,000	2,174,305,000	−10.9
Total energy for distribution	**78,240,526,000**	**80,034,756,000**	**− 2.2**
Energy lost in transmission, distribution, etc.	14,171,193,000	13,858,957,000	+ 2.3
Kilowatt-hours sold to ultimate consumers	**64,069,333,000**	**66,175,799,000**	**− 3.2**
Total revenue from ultimate consumers	$1,778,179,700	$1,884,094,800	− 5.6
Important Factors			
Per cent of energy generated by waterpower	40.9%	37.0%	
Average pounds of coal per kilowatt-hour	1.46#	1.49#	
Domestic Service (residential use)			
Average annual consumption per customer (kw-hr)	601	597	+ 0.7
Average revenue per kw-hr. (cents)	5.54¢	5.62¢	− 1.4
Average monthly bill per domestic customer	$2.77	$2.80	− 1.1

BASIC INFORMATION AS OF AUGUST 31st

Generating Capacity (kw)—Steam	24,025,800	24,155,600	
—Water power	8,975,300	8,888,000	
—Internal combustion	461,700	451,300	
Total generating capacity in kilowatts	33,462,800	33,494,900	
Number of Customers			
Farms in Eastern Area (Included with Domestic)	(505,230)	(500,176)	
Farms in Western Area (Included with Com'l—Large)	(204,200)	(207,207)	
Domestic Service	19,751,663	19,864,766	
Commercial—Small light and power	3,677,956	3,686,379	
Commercial—Large light and power	528,383	556,112	
All other ultimate consumers	62,530	64,185	
Total ultimate consumers	24,020,532	24,271,442	

*By courtesy of the U. S. Geological Survey with deductions for certain plants not considered Electric Light and Power Enterprises.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 1 OCTOBER, 1933 No. 7

APPLICATION OF COLLATERAL NRA CODES TO THE ELECTRIC LIGHT AND POWER INDUSTRY

By ALEXANDER MAXWELL
Director of Engineering, E.E.I.

Recent developments, which have been prominently discussed in the press, concerning the application of the Bituminous Coal Code to "captive" coal mines, owned and operated by steel companies for their own industrial purposes, have brought to general attention the manner in which various Codes of Fair Competition, formulated under the National Recovery Administration, may affect the operations of other industries which are apparently self-contained and which possess Codes of Fair Competition of their own.

As yet there has not been formulated any general rule governing the definitions on scope in these Codes of Fair Competition. It may be possible that this will not be done since the application of particular codes, in many cases, may involve considerations so complex that they cannot be foreseen, and the solution must necessarily be left to experience and future decisions in actual cases of collisions between codes. Nevertheless, the subject suggests consideration by all of those who may be affected by codes other than the basic code of their own industry because most of the codes so far submitted to the National Recovery Administration tend strongly to design their scopes to cover all commercial operations of the particular type concerned, whether these operations are within or without the industry submitting the code.

This situation is not necessarily undesirable and, in the long run, it may present as many advantages as disadvantages, since certain types of operations may be more advantageously conducted under the codes proper to those operations even when, in particular cases, they are merely incidental to some other main business. The principal problem is one of coordination and a clear understanding of the codes that are likely to apply in a particular case as well as those which are open to election on the part of the operator.

In the electric light and power supply field, many of the collateral codes seem to apply. Among these the code governing Retail Trade, which has been the subject of extended discussion involving practically all of the retail trades involved, will apparently govern the merchandising operations of electrical utilities. The feature of this code, around which controversy has centered, is a requirement that the minimum retail price shall be the invoice or other stated datum price, plus a specified percentage to cover overhead, etc. This provision has been alleged to constitute price fixing by some, while others contend that it does not.

In a similar manner the group of codes proposed to govern the Construction Industry includes by its terms, as drafted, all construction processes, whether executed by contractors or by owners for their own account; these codes have been formulated principally by general contractors, the building industry and by groups of specialized contractors. This group of codes comprises a "Master" Code for the Construction Industry, which contains the basic conditions intended to apply to all construction operations, and a rather large number of supplementary codes, which will probably increase in number, all governed by the conditions of the "Master" Code and containing more detailed provisions applying to the specialized activities concerned. These supplementary codes include a Code for Architects and one for Engineers which define the duties and responsibilities of these professional classes, principally in their relation to contracts for construction. Also, a Code for General Contractors is intended to apply equally to the building trades and to public and general engineering works; some of the specialists included in this category, such as land development operators, have stated that their problems are sufficiently specialized to justify separate supplementary codes, but it is not known at this writing whether or not the scope of the General Contractors' Code will be diminished in this manner.

There are also Supplementary Codes for Heating and Piping, Plumbing, Electrical Contracting and Painting, and others applying to the trades supplying certain materials used in the building industry, such as granite, limestone, etc. Of these supplementary codes, those dealing with operations, such as piping, electrical work and painting, are of considerable importance to electrical utilities, while those dealing with materials are probably of little direct interest.

Still other codes may affect electrical utilities in more or less important ways. The relation of "captive" coal mines and the Bituminous Coal Code to the Steel Industry has recently been extensively reported in the press and similar considerations may perhaps be expected to apply to electrical utilities in the same situation as these steel companies. Recently there has been proposed a Code for the "Electrical and Mechanical Service Industry" which proposes to govern the business done by service shops, such as those engaged in rewinding motors and making similar repairs to electrical apparatus generally, but not necessarily exclusively, for consumers. Also, there is a code proposed to govern the operation of rental properties, such as office buildings, which

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NOTES ON COMMERCIAL ACTIVITIES

By C. E. GREENWOOD
Commercial Director, E.E.I.

Save With More Light

In about three months from the sounding of the keynote for a National Lighting Program by George E. Whitwell, Chairman of the Sales Committee of the Edison Electric Institute, and the appointment of a Special Committee with M. E. Skinner, Assistant Vice-President, Niagara Hudson Power Corporation, as Chairman, there have been scores of utility companies mobilized for coordinated advertising and selling locally of better light for better sight.

Granting that for the past few years individual companies have registered outstanding accomplishment in building the lighting load, it is several years since there has been a concerted drive nationally for lighting business. The same companies are organized now to do a better job than before, with more extensive promotional effort, while other utilities that have been less active in the past, have been moved to join the lighting parade. A perusal of E. E. I. *Lighting News* will reveal a portion of the long list.

We need large sales forces, because depleted utility revenues as a result of the seeming necessity to "save" light in home, office and factory has brought us face to face with the cold fact that the consumer does not place a high enough value on lighting needs. Industrial superintendents ordering retrenchment in expenses do not think of required lighting intensities in terms of quality of product resulting therefrom, or of accident hazards when lighting is diminished; merchants do not always think of the use of higher wattage lamps in terms of effect on the buying public, and as a profitable return on investment; householders are not informed or convinced that the heavily shaded light for decoration in the living room will not be satisfactory lighting for the children to study under, nor for Mother to use for sewing, nor Dad for reading. They do not measure lighting costs in terms of the value of good eyesight.

These educational jobs are the most important ahead of the Commercial forces of the utility. Mother did not cut out orange juice for the children during this period called Depression because the California fruit growers have educated her to the fact that each glass pours in vitamins for better health, and Dad has enriched himself with vitamins and maintained a normal thyroid with tomato juice. But from little Willie up to Dad it was in the minds of the family to snap out the lights here and there to compensate for the expense of these "necessities." Inadequate illumination was accepted.

Our industry has sold lamps, higher wattages and lighting equipment, and not the WHY for using higher wattages and this particular equipment. Mrs. Consumer bought a snappy looking kitchen fixture on easy terms with a 150-watt lamp. The price recommended it and she understood the easy terms. The lumens of golden light it spread was all Greek to her, but the blame could not be placed on the salesman. However when the monthly bill increased 10c, she decided the "lumens" —whatever they might be—were too expensive and she reached for a 75 or 100 watt lamp and contented herself with its brilliancy. And similar conditions obtained among all classes of lighting customers.

Lighting Conscious

Our customers must be made more *lighting conscious.*

Fortunately a new sales tool has been developed, the use of which is spreading like the prairie fire. It is the Light Meter. It talks to the layman in terms he can understand; it visualizes the needs of the light user. This tool was developed by a man who had sold lighting and knew the handicaps. Let us hope that thousands of buyers of light of all classes will see and be convinced.

October and November—National Lighting Months—will include the peak of lighting activity, but we would be disappointed if these months were the only ones for pressure on lighting sales. Rather let this program of stimulation and coordination, which has for its objective nation-wide, intensive, local cooperative action, be the motivating force for further promotion during the entire lighting season.

The Electric Kitchen

For several years the Electric Kitchen has been a beautiful sight to see, but displays have represented an objective to be gained by piecemeal methods and not a complete unit of merchandise to be wrapped up and delivered. Over a term of years, "Electric Homes" were exhibited by utility agencies to help sell an idea. The ELECTRIC RANGE, as a corner-stone, was the start in a list of articles to purchase from time to time until the consumer was the owner of a finished kitchen.

Style has been creeping into the kitchen. During the past three years more homemakers in the upper brackets of income have become acquainted with their kitchens than in the decade previous. There is no immediate indication that there will be a shortage of domestic servants, and that the Club dining rooms will be ordering more chairs.

The bathroom with its tiling and colorful decorations has a rapidly growing competitor in the Modern Style Kitchen. One manufacturer has a complete Division, and a busy one, laying out Electric Kitchens for home owners. There is no charge for this planning service. If a reliable merchant is selling electric household devices, he can buy a complete kitchen unit from a catalog of this manufacturer, at varying prices, and have it delivered for display with colored cabinets, linoleum for the floor and other suitable fittings.

There are thousands of Electric Kitchens already installed in department and specialty stores which reveal the decorator's art in making an inviting room for the home workshop of tomorrow. These will fit in to the new spirit of living.

The electric utility can get 80 per cent of its domestic output from the kitchen. Everything that will promote greater attention to the kitchen, greater use by the homemaker or a greater number of items of Electric Kitchen equipment will be a boon to the utility. We can profit by promoting the Electric Kitchen and brightening up this corner of millions of homes. The ground work is being laid for constructive action.

Invest In This Book

The Electrical Merchandising Joint Committee which was sponsored by the former National Electric Light Association, together with the National Retail Dry Goods Association, the Na-

(Continued on page 208)

ELECTRIC REFRIGERATOR SALES MAINTAIN RECORD-BREAKING PACE THROUGH AUGUST

Total for First Eight Months of Year Nearly 900,000—Entries for Refrigeration Week Contest Will Be Received Until November 7th

Country-wide sales of household electric refrigerators, as revealed by the Electric Refrigeration Bureau's tabulation, continue at an amazing pace. For the fourth consecutive month a new high record was established in August when the sales reached a total of 95,413 units. This compares with 25,583 sold in August, 1932, and 68,465 in the corresponding month of 1931, the industry's peak year.

Total sales for the first eight months of the year were 890,380 units, as against 644,313 sold in the corresponding period of 1932 and 767,913 in the first eight months of 1931. The sales in the entire year 1932 were 769,695 units.

At the end of August, 41 States were over the eight months quotas and 22 of these had exceeded their quotas for the entire year. New York again led the way in volume of sales in August with 20,400 units, with Pennsylvania second with 9609 units and California third with 7,162.

CONTEST ENTRIES WILL BE ACCEPTED UNTIL NOV. 7

National Electric Refrigeration Week has passed, and although at the date of this writing it is impossible to estimate even the approximate number of shows held throughout the country, the amount of promotional material sent out from the Bureau's New York office and the number of inquiries received indicate that fully as many communities participated this year as last.

The Bureau wishes to impress upon all local Bureaus, Electrical Leagues and other organizations under whose auspices cooperative shows were held within the period from Sept. 30 to Oct. 7, inclusive, that entries in the Electric Refrigeration Week Contest will be received at the New York office, 420 Lexington Avenue, up to and including Nov. 7. Any cooperative exhibit or show where electric refrigerators were on display even for a single day within the above period is eligible to compete for the seven cash prizes aggregating $1150.

All that is necessary to do is to submit the figures covering the total attendance, the duration of the show, the number of participating exhibitors,

ELECTRIC REFRIGERATION BUREAU
SALES—HOUSEHOLD MODELS ONLY—FIRST EIGHT MONTHS 1933

	YEAR'S QUOTA	EIGHT-MONTHS' QUOTA—81%	ESTIMATED TOTAL SALES	% QUOTA REALIZATION
New England Division				
Connecticut	15,316	12,406	14,808	119.4
Maine	6,234	5,049	4,817	95.5
Massachusetts	39,027	31,612	44,392	140.4
New Hampshire	4,009	3,247	3,321	102.2
Rhode Island	6,435	5,212	7,855	151.0
Vermont	2,626	2,127	2,476	116.4
Eastern Division				
Delaware	1,607	1,302	2,039	156.6
Maryland & D. C.	15,944	12,915	22,601	174.9
New Jersey	39,021	31,607	40,207	127.0
New York	123,949	100,399	154,019	153.4
Pennsylvania	68,754	55,691	91,030	163.5
East Central Division				
Kentucky	8,934	7,236	13,159	182.5
Ohio	51,228	41,495	59,882	144.3
West Virginia	6,149	4,981	9,335	187.5
Middle West Division				
Iowa	15,232	12,338	12,122	98.3
Kansas	11,343	9,188	10,973	109.5
Missouri	22,078	17,883	33,242	185.3
Nebraska	7,837	6,348	7,654	120.6
Pacific Coast Division				
Arizona	2,295	1,859	2,161	116.2
California	62,735	50,815	52,263	103.0
Nevada	569	461	897	194.5
North West Division				
Idaho	2,582	2,091	2,113	101.1
Montana	2,785	2,256	3,216	142.6
Oregon	7,893	6,393	6,375	99.7
Utah	3,850	3,118	4,110	131.8
Washington	14,270	11,559	10,162	87.9
South Eastern Division				
Alabama	5,470	4,431	8,389	189.3
Florida	7,687	6,226	7,322	117.5
Georgia	6,537	5,295	10,419	196.5
North Carolina	8,601	6,967	12,559	180.0
South Carolina	3,427	2,776	4,782	173.0
Tennessee	7,830	6,342	8,483	133.8
Virginia	8,733	7,074	13,221	187.5
Great Lakes Division				
Illinois	61,455	49,779	62,353	125.0
Indiana	22,386	18,133	20,482	112.8
Michigan	35,191	28,505	26,955	94.5
Wisconsin	20,689	16,758	15,208	90.8
North Central Division				
Minnesota	15,809	12,805	12,791	99.8
North Dakota	1,996	1,617	1,667	103.1
South Dakota	2,558	2,072	2,222	107.2
Rocky Mountain Division				
Colorado	6,745	5,463	7,836	125.1
New Mexico	1,091	884	1,574	178.0
Wyoming	1,045	846	1,286	152.0
Southwestern Division				
Arkansas	3,664	2,968	5,017	175.7
Louisiana	6,525	5,285	6,383	120.7
Mississippi	2,742	2,221	2,794	125.7
Oklahoma	8,346	6,760	11,439	167.7
Texas	20,941	16,962	31,969	188.4
Totals	802,170	649,757	890,380	137.0

the number of sales made and prospects obtained, and the other data called for by the rules of the contest.

In the matter of sales, it should be borne in mind that not only the number of sales actually made on the floor of the show will be considered by the judges, but also the number of sales made to show prospects up to and including Oct. 21. After that date two full weeks are allowed for submission of entries.

The seven cash prizes, ranging from $500 down to $25, are certainly worth going after, and doubly so when it is remembered that the smallest town has an equal chance of winning with the largest city. Any one of the awards will help just that much toward defraying the cost of the exhibit or may be kept in reserve for some future activity.

FALL ELECTRIC REFRIGERATION MEETINGS UNDER WAY

Judging from the large amount of early season activity it is apparent that the field representatives of the Electric Refrigeration Bureau will be kept unusually busy in local cooperative organization work from now until the end of the year. The Bureau's field manager, Dr. G. W. Allison, left New York on Sept. 18 on a transcontinental trip in the course of which he will have addressed between 35 and 40 meetings of distributors, dealers, salesmen and central station executives and employees before his return about Nov. 1.

Reports of interesting and profitable meetings have been received thus far from Topeka and Emporia, Kans., Denver, Salt Lake City, Ogden, Pocatello, Twin Falls, Boise, Spokane and Portland, Ore.

The schedule from Oct. 2 to 11, inclusive, called for a series of meetings in California, arranged by State Director H. H. Courtright and covering the State from San Francisco to San Diego. A full schedule in Texas between the 13th and 19th will be concluded on the latter date with a noon meeting in Port Arthur followed by an evening meeting in Beaumont. Two large meetings will be held in New Orleans on the 20th, one a luncheon session of distributors and dealers and the other a dinner meeting of the Electrical League of New Orleans. Other meetings in the South and Southeast are scheduled for Birmingham on the 23rd, Knoxville on the 25th, Asheville on the 26th and Raleigh on the 27th.

The advantages of such meetings under Bureau auspices cannot be overemphasized. Not only are they invaluable in the promotion of definite plans for local activities, through the presentation of the Bureau's viewpoint and suggestions, but in countlesss instances they have brought together competing interests for the first time and thereby have succeeded in creating a mutual understanding and community of interest which have resulted in most profitable cooperative undertakings. The Field division of the national Bureau is at all times at the service of local refrigeration interests for the promotion of cooperative activity, and wherever meetings of this character are contemplated, the presence of one of the Bureau's representatives can be arranged for, provided conflicting schedules do not interfere.

NRA CODES

(Continued from page 197)

might apply to some utility properties where office buildings are in part rented or otherwise not used exclusively for the purposes of the electric utility.

From the point of view of the electric light and power industry, it is important that the application of the Construction Codes to the industry should be clarified in certain respects; two aspects of the problem being of a special interest. First, the Master Code and all of the supplementary codes, drafted primarily to govern work executed by contract, contain provisions and expressions relating to contractual work that are not directly applicable to utilities executing work for their own account, although these codes may contain provisions, such as those relating to wages and hours, that can be readily met by electric utilites. It is generally understood that such provisions as the prohibition of bid peddling, requirements for reports to certain industry authorities on bids and other business transactions, etc., do not apply to parties executing work on their own account, but this exemption is not explicit in the texts of these codes and may have to await interpretation. For example, the position of a public utility acting as its own general contractor is not clear with respect to the required procedure affecting bidding and the reports to be rendered.

The second and more immediately important aspect concerns the position of a public utility in connection with construction work that is incidental to operation and maintenance and in direct connection with the paramount duty of rendering service. Such work comprises many small projects involved in the continual rearrangement and adjustment of plant. These jobs unquestionably involve construction in the sense that something is built which did not exist before, and they are ordinarily executed with the same materials, tools and personnel as primary construction, but they are so intimately related to the act of rendering service that they are necessarily executed as incidental operations to this rendition of service. Although the individual items in this type of construction usually are small, the aggregate amounts may be large.

The Edison Electric Institute has filed with the NRA objections to the "Master" Code for the Construction Industry and to the Supplementary Codes for Engineers, General Contractors, Heating and Piping Contractors, Electrical Contractors and Painters. The essential character of the objections is contained in the following modification of scope, which has been proposed for inclusion in the "Definitions" sections of all of the above mentioned codes:

> "The provisions of this code shall not apply to work for or by electric light and power supply service where such work is an integral part of the light and power system owned and operated by an electric light and power company in rendering its duly authorized service."

A number of detailed revisions of other provisions of these codes also have been proposed to bring the texts into harmony with the principle contained in the foregoing basic exemption.

COOKERY COUNCIL PUBLISHES 1933 WINNING PLANS

The prize-winning reports in the New Victory Electric Range Contest, completed June 30, contain so many good ideas and suggestions that the National Electric Cookery Council is publishing an attractive booklet, based on the contest, which will be distributed about the middle of October.

Illustrations of a few of the advertising and promotional media, with brief descriptions of the plans and methods, used to cause their selections as prize winners, are features of the booklet. Special emphasis is placed on those important and fundamental "things to do" to promote electric cookery and electric range sales in the satisfactory volume that this major load-building domestic appliance is entitled to.

Also included is a skeletonized outline giving plans for organizing and conducting a Local Cookery Council of the type which experience has proven to be most successful and effective in operation.

Davidson Prize Paper

BETTER PUBLIC RELATIONS THROUGH SYSTEMATIC PERSONAL CONTACTS

An account of commercial activities that developed surprisingly good opportunities for improving public relations.

By H. M. SAWYER

This paper is a running account of an activity designed to bring about a greater public appreciation of the service rendered by the electric utility through direct personal interview with residential and commercial customers.

While culminating in the same result, the method of approaching these two classes of customers is radically different so that the account is divided into two sections. Under the heading of "Residential Customer Survey" is described the house-to-house canvass of the domestic service group. In its original conception it was a plan to organize and control the work of sales representatives and to insure the systematic uncovering of all appliance prospects. As the plan developed in practice, it became increasingly evident that its public relations value even exceeded its commercial value.

The second section of the paper is headed "Proving to the Storekeeper That Light Is His Best Salesman." This describes the plan used in interviews with commercial customers. Here again experience was somewhat at variance with original intent for in this activity we proposed primarily to convince the customer of the value of our service as it existed. Actually we have found a considerable increase in the sale of current because this plan so dramatically and forcefully presents the sales possibilities of better lighting to the shopkeeper.

In order that the account of the activity may not be interrupted or unduly cluttered with statistical tabulations or descriptions of the routine followed, the author has included such data in compact form as an appendix from which the exact procedure and results may be quickly learned by any one interested.

EDITOR'S NOTE: Due to space limitations it is impracticable to publish the appendix referred to by Mr. Sawyer. Mimeographed copies of the appendix will be supplied to interested member companies upon request to the editor of the BULLETIN. The exhibits in the appendix include: (1) Playlet for presentation to employees of the method of approaching customer in the residential customer survey. (2) Procedure for centralized control of salesmen's prospect survey. (3) Tabulation of results. (4) Typical call of lighting service man. (5) Procedure for commercial customer survey. (6) Lighting survey card. (7) Lighting analysis sheet. (8) Lighting maintenance schedule card.

THE RESIDENTIAL CUSTOMER SURVEY

One hundred and seventy thousand customers of the American Gas and Electric Company have been called upon during the past half year* by salesmen who had nothing to sell. That is to say, they had nothing *tangible* to sell, although actually they sold two of the most important factors in our business—understanding and confidence.

For without understanding you have *mis*-understanding. Without confidence you have suspicion. No business can progress against two such impregnable negatives.

The American Gas and Electric plan of Residential Customer Survey is predicated upon the simple fact that this industry no longer has a practically inexhaustible reservoir of unwired homes as the foundation of further growth, but must look very largely to present customers for future increases in business. Such increases depend upon two things: our customers must understand the true value of the service they are now receiving, and they must accept with confidence our statement that increased use of now-owned or to-be-added appliances will be to their advantage. Our operation was designed primarily to sell these two ideas, but of course under depression conditions it had a third purpose, which was to hold, so far as possible, residence consumption at present levels. Like other electric utility companies, we have lost in meter connections, but we feel that we can credit our relatively small loss of domestic revenue largely to the results of this survey.

We have 125 salesmen. They are Grade "A" men. In their towns they rate as leading citizens, with incomes which are locally considered substantial. They are paid a definite salary for work which is done under strict supervision, plus commission upon the sale of two load-building appliances which we now consider to be still in the promotional stage. These are ranges and water heaters. Prior to February 1, 1933, we also rated refrigerators in our promotional classification, but we now believe that refrigerators have sufficient popular acceptance to justify us in discontinuing their direct sale.

In the matter of sales and commissions, it is our policy to sell at the manufacturers' list, plus all installation costs, without price or premium inducement, and we allow our men commission for these major appliances sold within their territories whether such sales are made by us or by any one else whomsoever. Prospects for appliance sales are turned in to the company and by us allotted to local dealers or to manufacturers in accordance with the fairest plan we could devise. Human nature being what it is, there is, of course, always a temptation upon the part of salesmen and dealers to "cheat" in the matter of prospects. We faced this fact squarely, and we announced bluntly and emphatically both to our own employees and to the dealers that any one caught in an attempt to short-circuit around the established routine of handling prospects would be immediately and definitely out of the picture. We made it very plain that the offending salesman would be dismissed instantly, no matter how long he had been with the company: the offending dealer would be given no further cooperation of any sort whatsoever. The result of this cold declaration has been that we have had very little trouble, and what little there has been has not disturbed our dealer relations because we have maintained our policy mercilessly. Offenders paid on the nail.

For the purpose of this Residential Customer Survey operation, the salesman's working equipment consists of one

*Paper entered in prize awards contest in the Spring of this year—Ed.

This paper won the 1933 First Davidson Prize. Mr. Sawyer is vice-president of the American Gas and Electric Company.

The Residential Survey Representative carries no samples, brief case or other evidence that he is a peddler. He calls the housewife by name when she opens the door, introduces himself as the company representative, and his opening sentence is, "I have nothing to sell."

Very seldom does the Residential Survey Representative fail of being invited into the home. Customers appreciate that he is a man of responsible position with the company, there to render a service, and almost invariably they "meet him halfway." In this picture the Representative is seen referring to his customer card which carries complete information.

A "dispatcher" in the company office keeps the record cards in proper order and controls the operations of all Representatives. This strict control not only saves the representatives' time but insures complete and systematic coverage of the territory and guards against any neglect or failure in following call back appointments.

FORM 51A

CUSTOMER SURVEY — **PROSPECT CARD**

	RANGE	REFRIGERATOR	WATER HEATER
	SIZE	SIZE	SIZE
	PRICE QUOTED	PRICE QUOTED	PRICE QUOTED
	MAKE	MAKE	MAKE
	SOLD	SOLD	SOLD

SALESMAN | CREDIT RATING | TENANT | OWNER

RATE CUSTOMER IS ON	RE. GUAR. PER MONTH	AVERAGE MO. BILL	AVERAGE KWHRS	AVERAGE COST PER DAY	HIGHEST BILL MONTH	HIGHEST BILL AMOUNT
	$	$		$		$

TYPE PRESENT RANGE	NO SURFACE UNITS	TYPE OVEN	PRESENT FUEL COST	AGE	CONDITION

PRESENT TYPE REFRIGERATION	SIZE	LBS. ICE PER WEEK	ICE BILL	AGE	USED IN WINTER	CONDITION

CHECK APPLIANCES USED — MISCELLANEOUS

☐ IRON ☐ WASHER ☐ CLEANER ☐ TOASTER ☐ PERCOLATOR ☐ RADIO

Customer Survey Prospect Card—Front

DATE OF CALL	DATE OF CALL BACK	MAIL LITERATURE	RESULTS OF INTERVIEW
			LIST MAIN OBJECTION

Customer Survey Prospect Card—Back

item only—a ring binder accommodating his week's "stint" of customer cards plus a few reference cards and a couple for recording call-backs. The customer cards are illustrated herewith. They carry the names and addresses arranged by territories as for meter readers, the customer's form of rate, minimum guarantee, if any, average monthly consumption and average monthly bill, the highest bill within the year and the date thereof, and last, but most important, it carries the *average cost per day of the service rendered.*

Each Saturday morning the salesman receives 50 of these cards as filled out by the accounting department, and these represent his ensuing week's work. His job is to make ten calls a day, to show the customer how little she is paying for service received, to secure definite data regarding each customer's present range and refrigeration equipment, a check on other appliances in use, a clear understanding of the customer's attitude toward the company and, finally, ascertain whether or not the customer is a prospect for range, water heater—which the company sells—or for some other appliance which may be sold by one of the local merchants.

The approach is disarming, and practically never do the men fail to gain admittance. The reason for this is simple. First, the salesman addresses the customer by name and identifies himself as the company representative. This takes him out of the peddler class. In the very first sentence he lets it be clearly understood that he has nothing to sell —*to-day*. He states that he is calling on behalf of the company to give information regarding the new low rate, to correct any defects in service which may exist, or iron out any misunderstandings and to explain how the customer may get greater service at very low cost. Having established the fact that he has called in a friendly and helpful spirit, he opens with the statement that, as the result of figures recently compiled, he has learned that this customer's use of electricity costs but a few pennies per day, naming the exact amount as shown on the record card.

If the customer is disgruntled her complaint will be voiced almost immediately in response to this approach, because as we all know, the basis of most complaints is the ubiquitous "high bill," though the bill may be no more than fifty cents. However, this is exactly what the representative is looking for. He has on his record card the amount of the customer's highest bill for the year and the average monthly bill, this latter, as we have said, being broken down to reveal how small is the daily cost of electricity. Further, in the back of his book is a card upon which he has the daily electric service cost reduced to comparisons with other items of normal daily purchase or consumption, as milk, newspapers, cigarettes, movies, carfare, shoe shines, etc. If the customer is a woman recently marceled or manicured, the comparison may be made to the cost of beauty treatments, if it is a man who is smoking the comparison may be drawn to tobacco. A quick glance will generally reveal some unnoticed item of expense in the customer's home with which the electricity cost can be compared in a way to make it appear very insignificant.

Rates are then explained, but in the customer's language. The customer's attention is also called to the difference in cost of his present usage billed on the company's rate in 1921. This shows the customer that rates have been reduced. The actual dollars' difference is used in this discussion. The representative seldom refers to kilowatt-hours or the rate per kilowatt-hour; instead he states that the radio costs but a cent an hour to operate, the vacuum cleaner about the same, that toast costs but a tiny fraction of a cent per slice. As a rule the home owner has some "pet" appliance, which is considered practically indispensable and the identity of which is revealed in a few moments' conversation; the representative then uses this appliance as his argumentative fulcrum and seldom fails to move the complaining customer to a more favorable position. But the keynote of all "high bill" discussion under this plan is the cost per day. This is generally so insignificant by comparison with other expenditures and with the service rendered that the customer if at all fair-minded immediately realizes the hollowness of his or her complaint unless it actually is based upon a remediable defect in which case we, of course, are more than eager to remove the cause.

Not all complaints are of high bills, nor are all honest. One of our representatives found a whole city block up in arms against the company: doors were slammed in his face, he was called hard names, the neighborhood was a hotbed of anti-utility sentiment expressed in very plain language.

The cause, he finally learned, was simple thoughtlessness by several line gangs. It seems that there was a transformer station at the end of an unpaved blind alley in this neighborhood, and at that station was a storehouse from which supplies were drawn. Each Monday morning the trucks seeking supplies roared up this unpaved alley and back again, churning up clouds of dust which settled upon the neighborhood washing and the people all through that block were convinced that these trips were made for the sole purpose of deliberately and maliciously stirring up the dust to

ruin folks' laundry and thereby add to the company revenue through additional use of washing machines. The solution was very simple—a little oil to lay the dust and instructions to the drivers to reduce speed in this particular alley.

High-bill complaints when the bills are not high quite frequently uncover current stealing. One woman actually asked a representative how she might acquire a "stand in" with the meter reader so he would "fix" her meter. Another customer, a minister of the gospel, complained bitterly about his bill although it was obvious that he was not being billed for all the current consumed. He had long been under suspicion but had never been caught. Patrons of this sort are relatively few but are disproportionately important because such people are almost always active and vocal against the company and, therefore, are serious disturbers of public relations. Our Customer Survey reveals them most effectively.

Let me make it plain that our purpose in this Survey is not merely to assure customers that our bills are low for the service delivered and that they are getting their money's worth. We have found through the activity, that very many customers honestly believe that utilities compute their charges by rule of thumb, that meters automatically deliver records of consumption in accordance with predetermined schedule and that bills are rendered, as a doctor's, in accordance with our estimate of their ability to pay. Perhaps ten per cent of our customers so believe: they are an aggressive and vociferous ten per cent: they initiate or actuate much of the anti-utility "popular opinion"—not maliciously but ignorantly. Ten minutes of plain and understandable talk by a tactful and confident representative changes these determined and sometimes very expensive antagonists into almost equally active proponents.

As an example: a woman customer last autumn deliberately trapped one of our representatives into making the true statement that electric bills generally increase in winter because of the shorter hours of daylight. She then admitted that she had misled him into making this statement because, as a matter of fact, her bills were higher in the summer, she believed they were unfair and not in accordance with honest measurement and that this talk about higher bills during the season of shortened daylight was just so much "bunk." This placed the representative in a very difficult position, but he finally discovered that the woman did not operate her refrigerator during the winter months and was soon able to convince her that this caused the misunderstanding. She was glad to learn the truth, thanked the representative for his explanation and apologized for having unjustly accused the company of malpractice.

Which brings us to another interesting point, namely, the fairness and courtesy of so many complainants in acknowledging their error when a clear and convincing explanation is given. Literally thousands of reports conclude with some such phrase as, "when the matter was explained the customer apologized for complaint and criticism."

From all of the above it may appear that most of the work of the Customer Survey consists of adjusting complaints. Far from it. In some of the properties, whole weeks will pass and hundreds of calls be made without the report of a single complaint. In a summary of 5386 calls in Lima, Ohio, only 127 complaints are recorded: in Roanoke, a week's total of 129 calls revealed one complaint: in Atlantic City and vicinity, 13,684 calls revealed only 186 complaints: our total for all properties to date is 170,000 calls and 3,900 complaints. This indicates that we enjoyed a very fortunate state of public relations before the Survey: it also gives a hint as to the great improvements now in process, for it must be remembered that most of these complaints came to light only after the representative had practically solicited them. They consisted mainly of trifling misunderstandings and irritations not voluntarily reported to us but nevertheless poisoning public opinion, serving as anti-utility propaganda, building up resistance against wider and freer use of service and sales of additional appliances.

Fortunately for this industry, we have our enthusiastic well-wishers, as this Survey has revealed to our solid gratification. Hardly a report summary comes in that does not contain one or more instances of customers' expressing satisfaction with and appreciation of the service and personnel. An instance was the summary of one man's week's work in Roanoke. Out of 39 calls, 23 customers made complimentary remarks about the company and the service. A decided novelty was one woman who complained that her bill was too low. She felt she was getting more service than she paid for. Another took up the representative's time in boasting that she was the first person in the community to own an electric iron. One old gentleman spent almost an hour telling the representative what a fine company he worked for. Any number thanked the men for calling, expressing appreciation for our interest. Two customers are reported as wanting to buy stock in the company. The effect of all this upon the morale of both the salesmen and office personnel is hardly to be calculated.

One of the opportunities offered by this Survey was that of scotching careless or malicious gossip or mis-statements. One customer, for example, said it was commonly told around the neighborhood that the president of our company drew a salary of $600,000 a year, which she thought a little stiff. Another revealed that she wanted to use an electric range but had been told by neighbors that the rate was prohibitive. Dozens of such misunderstandings and absurdities are explained away each week because the Survey men have favorable entree to the home, they encourage the customers to talk freely and frankly, and then are able to remove misconceptions which otherwise might do great harm.

At the present time there is, of course, a great deal of unemployment in some of the communities we serve, and the Survey representatives come in contact with much discouragement and misfortune. It has been a cause of gratification to the executives of our company that the men have reacted to this condition in such a fine way. In an extreme case a family was found without fuel, literally freezing. The representative immediately went into action with the result that the situation was relieved. In another case a company truck was detailed to haul wood for the poor folk of a negro church and the old colored preacher promised with tears in his eyes to publicly pray for us. An elderly couple, too proud to apply for relief, were found and their wants supplied. These cases, fortunately few, are mentioned simply as showing the point of view which this Survey-experience has engendered in the representatives. They are no longer actuated solely by motives of selfish gain but with a spirit of public service, and if in emergency it is indicated that such service consists of finding fuel for the needy, why, they go out and find the fuel. Mayhap this is casting bread pretty far out on the waters, but we are content to feel that it touches a fundamental of to-day's public relations.

Not that this is an eleemosynary activity; on the contrary, we believe it the most practical and profitable adventure

in load-building so far undertaken by our company.

We have contacted 170,000 customers, and in doing so we have uncovered 12,000 prospects for refrigerators, ranges and/or water heaters. That is better than 7 per cent, and they are all real prospects, not mere "suspects," for we rate as prospects only those who indicate that they are in a financial position to purchase and are sufficiently interested to grant a definite call-back appointment to which the representative may bring complete sales data for discussion.

From which it will be apparent that the original commercial objective of the plan has been attained. We started out, as we candidly admit, to uncover prospects for our sales department. But in doing so we discovered and developed what has proved to be a very successful solution of that perplexing customer-relations problem which has been the serious concern not only of our Company, but, we believe, of many other utility companies for a number of years.

PROVING TO THE STOREKEEPER THAT LIGHT IS HIS BEST SALESMAN

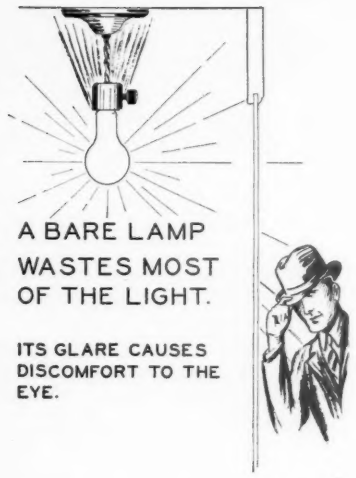
In these depression days, the shopkeeper, like every one else, is looking about for ways and means of reducing costs. In most instances he has eliminated much of the waste, but personal considerations may influence him in the retention of certain practices or services which might be dispensed with. There is, however, one member of his staff who, while he is always on hand to interest customers and close sales, has no friends or family to intercede for him. This salesman is "light" and once every month the proprietor of the shop is forcibly reminded of his existence, when the bill for his services is received. Finally a day comes when, without the slightest compunction, often with a deep-seated feeling of satisfaction, the storekeeper proceeds to cut this salesman to a point where his effectiveness is lost, or he is reduced to a condition of complete impotence. The case is exceptional where the business man, especially the proprietor of a small store, has full appreciation of the value of light as a means of attracting customers to his shop or as a decorative adjunct in the sale of merchandise.

This reduction in commercial lighting, while more marked in some localities than others, was general all over the country in the early part of 1932. In a large number of stores interior lighting has been dimmed, window displays are inadequate and outdoor signs have been dispensed with altogether in certain instances. The Commercial Department of the American Gas and Electric Company has given a great deal of thought and effort to the problem of arresting the trend. New business managers, in the subsidiary companies, have worked like Trojans but without appreciable effect. Lighting sales representatives redoubled their efforts only to be met with apathy and occasionally with open hostility by commercial customers. These field representatives, although fighting hard, were being steadily forced downhill during the early part of 1932. It was at this point that the Commercial Department of the American Gas and Electric Company developed a plan which gives promise of placing the electric company on an altogether new plane of amicable relations with its commercial customers. Conceived as a non-remunerative service to commercial customers the plan has not only checked the decline in store lighting but has actually resulted in a substantial increase in load.

The manner in which this plan was developed is extremely interesting and its application will benefit every electric utility in the country, when properly carried out.

Call it what you will, accident or a very alert management led to the discovery of a new instrument which has been recently perfected. This instrument consists of a cell sensitive to light which permits direct and instantaneous reading of the quantity of light. The entire equipment comes packed in a handy little case similar to a small voltmeter. The cell, itself, which is connected to the meter by a flexible cord, is an innocent looking affair encased in bakelite. It appears to be nothing more or less than a solid metallic disc with a series of contacts around its circumference, and it is difficult to conceive of its being damaged through any ordinary usage. Yet it responds to the most delicate impulses such as a puff of smoke from a cigarette, and will operate through the widest range—from pale moonlight to the most brilliant daylight. The dial of the meter may be read at three different scales, giving it a range sufficient for all practical lighting conditions.

Lighting Service Kit developed by the Commercial Department of the American Gas and Electric Company for use with the illumination meter. The picture shows photoelectric cell in place on the sliding bracket with the adjustable socket arm in the upright position. The clear and stippled glass plates are ready for insertion and a collapsed reflector is attached to the lid of the kit.



Visualizing card (greatly reduced) for use by lighting service men. The three illustrations on the next page are also reductions of visualizing cards.

The layman may place this instrument before him and read directly, without the slightest difficulty, exactly the amount of light reflected on the cell. The slightest variation in the quantity of light, such as the passage of a hand between the light source and the cell is immediately indicated. While the scale is in foot candles, the customer is asked to forget all that he has ever been told about watts and foot candles and to look upon the units indicated on the meter as pounds of light, so that there is no confusion resulting from unfamiliar terms.

Other devices produced in the past have been bulky and of such a delicate nature that they were only suitable for use in the laboratory, and even then required an expert to operate them. Engineers who recall long hours spent in college laboratories, testing a single lamp with a huge apparatus called a photometer, will be enthusiastic about this simple little instrument.

The manufacturer had developed this cell for certain specific purposes and had not fully realized its possibilities in the field of commercial lighting. It was obviously a useful instrument for checking and of rugged construction which made it adaptable for general mobile application, but it remained for the management of the American Gas and Electric Company to visualize its amazing potentialities as a means of demonstrating to the storekeeper the true value of electric light. They saw that with this meter it would be possible to prove to the customer definitely and conclusively the results to be obtained by controlled intensity and quality of light. The vision once conceived, it was necessary to produce a practical mechanical method of laying the proof before the customer in the simplest way possible and with this in mind the company developed a so-called demonstration kit.

This kit is packed in a moderately small case about the size of an overnight bag and contains the equipment necessary for presenting various tests quickly, conveniently and convincingly. A sliding bracket carries the illumination cell and provides convenient adjustment of distance between the target and lamp. A light source is provided from an upright supporting two sockets with cord and plug for attachment to any outlet. Within the kit is packed an assortment of readily assembled elements. Included among these is a collapsible reflector that fits over the lamp base, which is used in demonstrating the effect of reflectors in store and window demonstrations; a piece of clear glass to show that there is a slight diminution in light even when the glass through which it is transmitted is perfectly clean; a piece of glass covered with a thin paint spray equivalent to a dust deposit of about one month, (when this glass is inserted between the light source and the cell it shows a reduction in light of approximately one fourth); a set of various colored pieces of cardboard to show the reflection values of different colors used in decorating the walls and ceiling of the store. A convenient slot in the kit case supports these cards, one at a time, and by reversing the cell the amount of light reflected from the surface is measured directly. There is also carried in the kit a new standard lamp, and one of the so-called gyp lamps which are now on the market. By using the new standard lamp as a basis for comparison, it is a very simple matter to demonstrate the wisdom of changing lamps when they become dark and the folly of attempting to save a few cents by buying a poor quality lamp which has an efficiency far below standard and consequently paying a sum for the current consumed during the life of the lamp, which is many times the amount saved on the purchase price.

In addition to the testing equipment the lighting service man is furnished with a set of seven diagrammatic cards to assist him in presenting his story of adequate window and display lighting to the customer, and he also carries with him a supply of maintenance record cards which are given to the customer and upon which he may keep a record of the dates when lights were cleaned and other pertinent information regarding his lighting system.

Members of the Commercial Department took the first crude homemade kit which had been constructed by a tinsmith under their direction, and demonstrated it with customers in order to develop a technique before equipping the lighting service force with the device. While they had anticipated good results, they were amazed at the reception secured from customers. Difficult cases were deliberately sought out and storekeepers who had been strongly antagonistic because of alleged high bills and service complaints, were completely converted and frequently indicated a desire for additional lighting. While, in general, it was found that the kit had its widest use in stores, applications were made in schools, industrial plants and other business concerns. The reaction of newspaper men was particularly interesting and almost invariably they have been so impressed with the merits of this demonstration that they have either featured the illumination meter in news stories or have made editorial comment upon it.

Recently there was so much discussion of "Technocracy" that a prominent economist paraphrased the term and pointed out that what the country needs is "Salesnocracy"—a return to fundamental sales policies. These first field demonstrations gave very definite evidence that, given the proper equipment, it was not difficult for the company representative to convince the storekeeper that he should turn to at least one basic selling principle . . . the attraction of customer attention and desire by means of light.

We believe that it is of the utmost importance to give field representatives a thorough course of instruction in the use of the demonstration kit. To hand a man a kit and send him out would be equivalent to giving a novice a set of tools and expecting him to complete a finished piece of cabinet-work.

After the actual trial in the field, the commercial department was satisfied with the method and equipment and through the cooperation of the manufacturer a sufficient number of kits were provided to equip all of our lighting service men. Incidentally, these men are instructed to introduce themselves as "Lighting Service Men." They are not "Salesmen" in the accepted use of the term and are asked not to assume "high hat" titles such as "illumination engineer"—just plain "lighting service

men," whose function is to give the customer service rather than to sell him anything. These men were then brought together for three days' schooling in this demonstration work. At the school the following points were emphasized:

1. The plan is primarily designed to promote better relations between the commercial customers and the electric company through personal interviews. We are seeking criticism of our service and at the same time wish to show the customer how he may utilize this service to better advantage.

2. Lighting service men in contacting customers are to make perfectly clear to storekeepers that they are not endeavoring to sell additional lighting or equipment. Their mission is to explain how the storekeeper may increase his sales by utilizing more effectively his existing equipment.

3. Before calling upon a customer, the service man will secure from our records complete information regarding the service to that customer. This should include monthly consumption, amount of average bill, distribution department records as to the voltage in the locality and any recent complaints which might have been made by the customer. From the average bill figures, he determines the daily average cost in order to show the customer how little he has spent for electric service. In this way, the service man will be able to convince the customer that he is receiving full measure of service for the money he pays and that the amount is small compared with the benefit received.

4. Through the demonstration kit he can show the customer that there is more to proper store illumination than some wire and fixtures which require lamp renewals. By means of this kit he is enabled to do something that was never before possible and that is to demonstrate, in a simple manner, that this star salesman, "light" has only been working in most establishments at from ½ to ¾ of his maximum efficiency.

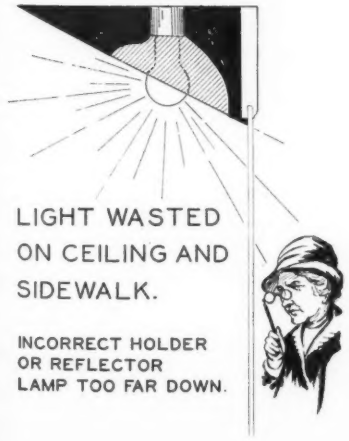
The following are the major points to be developed at each contact and they are listed together with explanatory notes showing how they should be demonstrated with the kit.

(a) *Lack of Maintenance*

The service man at the opening of the interview with the customer should point out that lamps and shades should be maintained spotlessly clean. Failure to do this is a reckless waste of light. This creates an opening to present the customer with a "maintenance record card." It is printed on heavy cardboard, 8 in. x 15 in., with an eyelet so that it can be hung in a convenient place. The card contains instructions for light maintenance and a schedule upon which the customer may record the dates of cleaning and washing interior window and sign lights. Other pertinent information on the card is filled in by the service man, including the proper voltage of lamps, proper fuses, company telephone number and his own name.

The clear and painted stippled pieces of glass in the demonstration kit are used to illustrate the fact that a dust cloth is often all that stands between good light and the poor apology for it furnished by a dirty lamp and globe.

Much depends upon the ingenuity of the service man in these demonstrations and he should seize every opportunity afforded by conditions in the store to dramatize his story. For example, it is not uncommon to find a globe that is obviously dusty. Place the illumination meter in a fixed position directly below it and ask the customer to note the reading of "pounds of light." Now remove the globe, shake out the accumulation of pre-historic bugs, dust it and the lamp with a cloth and restore it to the fixture. Now ask the customer to read the meter and note the increased illumination.



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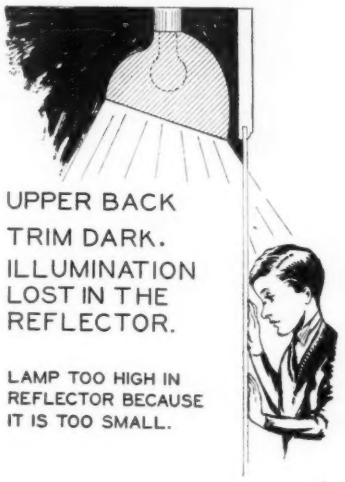

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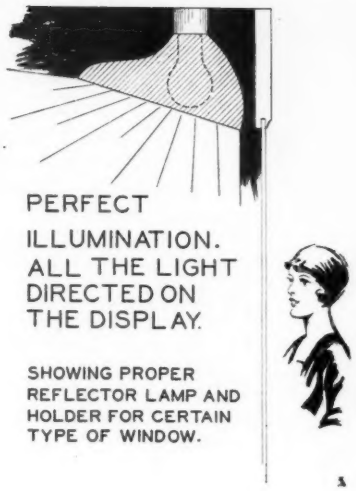
(b) *Proper Voltage of Lamps*

Customers frequently use lamps rated at a higher voltage than the actual socket voltages being supplied them. Assume that this is 115 volts. The service man inserts a 115-volt lamp and a 120-volt lamp in the kit sockets. Now by switching on first the proper voltage lamp and then the high, he can show the customer that he is losing one-sixth of the light. It is a simple matter to explain that while the 120-volt lamp gives a longer life, the loss in efficiency with it is so great as to many times offset the supposed saving.

(c) *Poor Quality of Lamps*

It is difficult to convince a man that he should buy a Mazda lamp when he can purchase a Japanese or other sub-standard lamp of the same rating for half the price. The illumination meter will demonstrate so conclusively that the good lamp is much cheaper in the long run than the poor lamp that the customer will never again buy the inferior quality. This test is similar to the previous test with a good lamp and a substandard lamp screwed into the sockets and lighted alternately. The meter will often show that the poor lamp is only giving half the light secured from the good lamp.



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(d) *Unwise Selection of Color For Wall and Ceiling Decoration*

This is a most interesting demonstration and customers are amazed to find that a change in color of approximately the same tone will vary the amount of light reflected. In this test the cell is reversed and with its back toward the light source. Now a color card is inserted in the holder so that only reflected light is directed on the cell. Readings are taken with various tones and colors and the customer is shown how the reflected light changes from the extremes of 80 per cent reflection with a white surface to no reflection at all from black.

(e) *Lack of Cleanliness of Walls and Ceilings*

This demonstration is similar to that shown for dusty lamps and may be made with the white card and a faintly tinted color card. The service man should stress the fact that plenty of soap and warm water will prevent wasted light.

(f) *Proper Control of Light*

In discussing the control of light, the lighting service man will find the kit of exceptional value in dramatizing his story. Ask the customer to observe the meter reading with the bare lamp lighted. Now adjust the reflector and show him how the "pounds of light" increase when the rays are directed on the display. Remove the bracket holding the light and reflector. Pick out some dark spot in the store and direct the beam of light upon it, at the same time explaining to the customer how intensive spot lighting may be used to attract attention to specials, to brighten counters, etc.

During the discussion of light control, the service man should use the Illumination Illustration Cards to explain correct window lighting and fixturing.

After the service man had been thoroughly informed about the equipment and technique of its use, they were presented with hypothetical cases and took turns carrying on a dialogue before the

group. One would act as customer and the other as the Company representative who was to meet and answer certain specific conditions.

At the completion of the school, the New Business Managers were instructed to continue to rehearse their staff until every man was letter perfect in his part.

The Commercial Department has felt that it was most important to devote its energies, at this time, to the smaller commercial customer and for the most part the activity has been carried on in this group. In spite of this policy, there has been such insistent demand from certain larger customers for demonstration and analysis, that we have been forced to take care of them.

In one instance, the manager of a large group of chain stores requested a demonstration and was so enthusiastic about it that he asked the lighting service man to complete analyses of all of the stores in the chain, as soon as possible.

In another instance, the secretary of a merchants' association requested demonstrations for all of the members of the association, so that they might profit by improving lighting conditions in their stores.

Some very interesting cases may be cited of unexpected results from these interviews. For example, a firm of architects were interviewed by one of our field representatives and they were much impressed by the demonstration and immediately saw its usefulness for accurately determining the distribution and efficiency of various types and makes of lighting fixtures that they might be considering for a building. One of the members of the firm who, incidentally, is the leading school architect in the community, requested that we call with him on the principals of the schools he had built, give them the demonstration and urge them to get the most from their lighting. He further suggested that in the future we call with him on school boards for whom he was drawing plans so that his recommendations might be justified by means of the demonstration.

In presenting the maintenance schedule to the manager of an automobile sales and service company, the representative was introduced to the manager of the Buick and Oldsmobile Divisions of General Motors in that particular territory. This gentleman was so impressed with the value of the maintenance card's assuring the proper care of lighting equipment, that he asked if he might have a copy to send to his main office with the suggestion that they have a similar card prepared for all of their dealers.

One rather amusing incident was recited by the lighting service man in a southern Ohio town who called at a small cigar store and gave his demonstration. He found that over one-half of the lamps were 10-cent lamps and that the proprietor was using 120-volt lamps throughout. After promising to remove the high voltage lamps and, in future, to purchase nothing but lamps of a standard American manufacture, the proprietor would not permit the representative to pay for a package of cigarettes but insisted upon giving them to him as some small compensation for the demonstration which he had put on.

While the plan has not been in effect very long we have already made over 1200 calls and approximately one-half of that number of call-backs. Layouts have been submitted recommending approximately 500 kw increased wattage. Already these recommendations have resulted in adding 184 kw to the company's load.

Recently a representative of the National Lamp Works of the General Electric Company spent some time with one of our field representatives in actually calling on customers where demonstrations were being made and in concluding his report he said:

"We see unlimited possibilities in this activity which the American Gas and Electric Company has conceived and so beautifully developed, and feel that aside from the very great value in building customer good will, it can certainly pay its own way with increasing revenue. However, I do not feel that the number of stores which immediately accept and put into effect the lighting analysis submitted, is in any sense of the word an accurate measure of the increased use of light which is brought about."

From our standpoint the building of customer good will is the most vital element in the plan. We believe that the results already obtained show very clearly that even were there no increase in lighting the improvement in customer relations and the arrest of the trend toward lighting reduction would justify many many times the modest expenditure in money and the effort given to training lighting service men.

That solution, as expressed at the opening of this paper, is the "sale" of understanding and confidence. Fully 95 per cent of all complaints are due to misunderstanding. Fully 50 per cent of all sales resistance met by our own and by independent appliance merchants' salesmen is due to lack of firm confidence. When you "sell" understanding and establish confidence you at one stroke place your public relations upon a basis of mutual respect, and you open that home or business establishment to freer, wider and wider and mutually beneficial use of the service which it is our privilege and duty to render.

COMMERCIAL NOTES

(Continued from page 198)

tional Retail Hardware Association and the National Retail Furniture Association, has brought from the press a Report of its activity under the caption of "Merchandising Electrical Appliances." Compilation was made by Dr. Kenneth Dameron, former Executive secretary of the Committee and now head of the Retail and Wholesale Division of the National Recovery Administration under the direction of Deputy Administrator A. D. Whiteside.

The surveys and investigations of Dr. Dameron, together with the researches and reports from other authorities in the merchandising field, make this report a highly useful reference manual on the subject of electrical appliance merchandising.

The book regularly sells at $4.00 per copy but any member of the Edison Electric Institute or a former member of the National Electric Light Association, may purchase at $2.60 net. Orders may be forwarded to the Commercial Department, Edison Electric Institute, 420 Lexington Avenue, New York City.

Buy Now!

Buy what? Shall the spending margins of those who will be influenced to support the nation-wide NRA campaign be invested in useful electrical devices or will this money be diverted into other channels?

There are unmistaken signs that we are heading for business recovery. Resumption is not to take place overnight, and there are many places in the foundation that will need strengthening before we get up to speeding the building process. But as an industry we must be ready at the first knock of opportunity.

Thousands of people are going to contribute to the "Buy Now" movement which will speed up until Christmas. Shall the purchase from the retailers be an electric refrigerator, a toaster, an electric casserole, waffle iron or other useful electric device, or will the investment be in something non-electric?

The answer to these questions is up to the Commercial men of the utility companies.

Byllesby Prize Paper

INCREASING THE USEFULNESS OF THE ACCOUNTANT IN THE PUBLIC UTILITY INDUSTRY

By LOUIS N. ROWLEY, Jr.

Out of the significant and revolutionary economic changes of recent years has grown a new science of accounting so far removed in concept and technique from the traditional art of accountancy as to be almost unrecognizable. The accountant, in meeting and overcoming the problems presented by the ever increasing size and complexity of business organizations and undertakings, has achieved a new status in industry, has become an integral part of the management rather than an adjunct thereto. The extent to which utility accounting reflects the general progress of the science might well be used, therefore, as a measure of the effectiveness of the utility accountant and, by the same token, as an indicator of the possibility of increasing the usefulness of the accountant in the electric light and power industry.

The major influence responsible for the radical changes which have taken place in accounting philosophy and technique has been the general acceptance of the concept of management as a science. The first requirement of any science is a technique of measurement adapted to the analysis of experience, the verification of hypotheses and the final formulation of the results of investigation into laws or standards. The fundamental economic unit of measurement is the pecuniary or monetary unit. It was but natural, therefore, that the accountant, accustomed to dealing with such a unit, should be an important factor in the development of managerial science. The effect on accountancy was to shift the emphasis from the traditionally important function of recording financial facts to the more intrinsically important functions of analyzing and interpreting such facts.

It was soon realized that the usual records of income and expense and the statements of assets, liabilities and capital were woefully inadequate to supply the management with the facts needed to the successful exercise of business judgment, the major defect being the inherent error involved in failing to recognize and evaluate the fundamental difference between various classes of products or services. With no means of ascertaining and analyzing the cost of any given product aside from special estimates and compilations of doubtful accuracy, it was impossible to determine the profitability of any given product and, as a consequence, management was blind. Industrial accountants stepped into the breach and devised a specialized methodology which recognized the differences between various classes of products and provided a means of evaluating such differences continuously and as a part of the regular accounting procedure. Cost accounting now finds almost universal application in all the major industries and is a concrete illustration of the modern concept of accounting as a tool of management.

This paper won the 1933 Second Byllesby Prize. Mr. Rowley is a Cadet Engineer with the Brooklyn Edison Company.

Utility accountants, however, have been slow to acquire the managerial viewpoint and, with a few exceptions, no technique of accumulating and presenting a continuous cost analysis as an integral part of the accounting procedure is to be found in the electric light and power industry. At least five reasons for the slowness of utility accounting to reflect the general progress of the art can be discerned:

1. Primarily, the industry has lacked the impetus of economic pressure which has proved such an effective stimulus to managerial progress in other, less favored industries. Rapidly expanding sales volume, a characteristic of new, vital industries, and protection from competition within the industry, have made it possible, in the past, to realize a satisfactory return on the business as a whole and to make it unnecessary to ascertain the relative profitability of the several classes of services. In the face of diminishing sales expansion and more competition from other services, however, a premium is placed on an accurate knowledge of costs as the first step in promotional efforts.
2. A high proportion of the cost of electric energy consists of expenses incurred jointly for several or all classes of service and therefore difficult of allocation. On the other hand, the coincidence of production and sales eliminates many perplexing problems characteristic of other industries. In the light of the successful application of continuous cost finding as a part of the regular accounting procedure outside of the utility field, the technical difficulties involved cannot be considered insuperable, although such an attitude has been, and is, prevalent in the electric light and power industry.
3. In the past, utility accountants have concentrated attention on the accounting problems surrounding the question of valuation for the determination of the rate base. To an ever greater extent, however, regulatory bodies and commentators on utility subjects are realizing that such concentration precluded study and analysis of the actual costs of serving the consuming public and that these costs constitute a greater portion of the price the public pays for electric energy than does the return on the invested capital.
4. The reluctance of utility managements to accept, in principle, the policy of maintaining a system of continuous cost analysis may be traced in a large measure to fear that such a cost record would automatically fix rates on a cost-plus basis. This attitude has characterized most comments on proposed cost finding techniques. It should be clearly and definitely understood that rate making is not the purpose or function of continuous cost analysis. Primarily, the purpose of cost finding is to provide management with the facts necessary to the successful exercise of business judgment.
5. Finally, utility managements have doubted that the advantages of a complete cost accounting system would justify the increased cost incurred in the accumulation of such records. It is generally felt, in this respect, that cost finding procedures involve considerable quantities of red tape and thus cannot fail to increase the cost of accounting unduly. That such is not the case has been proved conclusively by the experience of industries where cost accounting has been long in use. Such experience has shown the knowledge to be derived from complete cost information to be indispensable to the successful conduct of the business and the slight added cost involved a worth-while investment.

We have stated, briefly, the principal reasons responsible for the absence of continuous cost finding procedures in utility accounting and have, in the same breath, attempted to prove them baseless. It is not sufficient, however, merely to dispose of objections, it is necessary to show, as well, that sufficient advantages will accrue to the industry, as a result of the adoption of such an innovation, to warrant the effort and expense involved. Two classes of benefits may be reasonably expected to result from the successful development of continuous cost analysis procedures: (1) benefits resulting from improved internal con-

trol, (2) benefits resulting from improved relations with regulatory bodies and the public.

In the past, proponents of continuous costing, have, we believe, failed to emphasize sufficiently the importance of such a procedure as a tool of management rather than as a basis for rate analysis. As additional business becomes increasingly difficult to secure and competition, from other utility services outside of the industry and from alternate sources of power such as the private plant, becomes more severe, it becomes increasingly important that utility executives have immediately at hand every available fact needed to serve as a basis for managerial decisions. The information resulting from a continuous cost analysis would tie in with the present classification of revenue, which is according to class of service, and indicate to what extent each is profitable. A knowledge of the relative profitability of each type of business would, in turn, serve as a guide for the intelligent direction of sales efforts. Concentration on the most profitable services cannot fail to be more effective than the spreading of the same amount of effort over all services, profitable or unprofitable, and, at the same time, will prevent repetition of the somewhat ironic spectacle of strenuous sales efforts being made to secure business, which, if the facts were known, might prove entirely incapable of paying its way. There can be no question, on the other hand, that it is sometimes advisable to secure unprofitable new business in the light of other considerations, but at least this step can be taken with open eyes when the facts are revealed by cost analysis.

As it becomes increasingly necessary to "sell" electric energy rather than merely supply the demand for it, the price factor becomes increasingly important. The widespread recourse to so-called "promotional rates" is evidence of this tendency. The problem of reducing the price of electric energy can be attacked in two ways, either method requiring cost data for successful application. Starting with the price itself, rates can be fixed in such a fashion as to lower the unit cost by placing a premium on increased use of energy. With the data supplied by continuous cost analysis, the largest single factor in the problem is evaluated and the rate analyst can proceed to devise a rate that will achieve this objective, and, at the same time, tend to produce the maximum net return.

A more fundamental approach to the problem of lowering the price of electric energy to meet competition lies in the study of costs with a view to increasing efficiency and reducing expenses. Here the continuous cost record proves its true worth, providing executives with a technique as well adapted to the measurement of commercial efficiency as is the engineer's thermo-dynamic technique to the measurement of mechanical efficiency. Experience in other industries has shown cost control to be one of the principal benefits of the introduction of cost accounting systems and there is no reason why such experience should not be duplicated in the utility industry. Cost reduction is of special value as a method of lowering the price of electric energy since it benefits the consuming public without decreasing the net return to the utility. In this respect, it is a true economic gain to all parties concerned.

In spite of the attention that has been focused on fixed capital accounting, utility accounts still provide no readily available means of measuring the productivity of any particular item or class of invested capital, except as isolated compilations may reveal. Continuous cost analysis, by indicating the profitability of each class of service, serves the added purpose of measuring the productivity of the capital invested, specifically or jointly, for the benefit of that class of service. A knowledge of the productivity of the capital invested in the various classes of service will, in turn, provide a firm basis for the exercise of managerial judgment in respect to increases of facilities. Although in many cases the utility has no choice in the extension of facilities, a knowledge of the return that might be expected from the capital expenditure involved in such an extension, as indicated by the cost analysis, would certainly influence executive decisions as to the scope and character of the required extension. Here again the cost record does not make the decision, it but serves to present all the facts to management, allowing management to act as policy dictates, but always with open eyes.

When considering the improved relations with the regulatory bodies and the public resulting from the adoption of a policy of continuous cost finding, it is particularly important to understand clearly that the primary purpose of such an innovation is to provide necessary facts in the form most suitable for managerial use. The impression is prevalent that such records would automatically fix rates on a cost-plus basis, as previously stated. Again it must be said that the cost analysis does not make the rate but merely serves the purpose of presenting accurate and complete data on one of the major factors in the determination of a rate. Price economics, tradition, competition, and public policy all must be evaluated in a complete analysis of the problem. Utilities may have to maintain classes of service which cost analyses show to be unprofitable and likewise may, with complete economic justification and the acquiescence of the consuming public, earn a larger rate of return on one class of service than on another. In either case, the cost analysis merely serves to indicate the true state of affairs and does not fix the rate and it is inconceivable that any regulatory body would so misuse the data supplied.

The peculiar value of the continuous cost record as a logical method for presenting costs in rate controversies is that its evident intrinsic superiority over the special cost compilations usually prepared for such cases tends to inspire public confidence. That continuous records are intrinsically superior to special compilations cannot be disputed. A continuous cost analysis, accumulated as an integral part of the regular accounting procedure, is subject to the control of the general accounts, which insures a measure of accuracy not otherwise possible, and tends to eliminate the errors of judgment likely to occur when a special estimate or compilation is prepared. Further, the suspicion frequently attached to cost analyses compiled for the specific purpose of a rate controversy cannot be attached to currently compiled figures direct from the books of the utility company. By substituting facts for estimates and opinions many possible sources of argument are eliminated and the position of the utility with respect to the regulatory body is strengthened. And finally, the willingness of the utility companies to present complete, easily substantiated facts regarding costs cannot fail to result in improved relations between utility and regulatory body.

In view of the possibility of the ultimate clarification of the question of valuation and the consequent shift of regulatory interest to operating costs as the other major factor constituting the price of energy to the public, it would seem essential to be prepared to go to the regulatory bodies with an established basis for presenting such costs, a basis recognized by both utility and regulatory body as a suitable starting point for discussion.

Thus far we have pointed out a serious deficiency of utility accounting, presenting the major reasons for such deficiency and attempting to dispose of them, and, finally, have stated the advantages to the utility industry of the adoption of the policy of continuous cost analysis. Now, granted that the adoption of such a policy would be of true advantage to the electric light and power industry, how may the technical difficulties best be overcome and the widespread and successful application of continuous cost finding as an integral part of utility accounting practice be assured? Naturally such a technique cannot spring into being, full panoplied, but must be the result of careful study and research and extensive experimentation. It does not seem likely, at the present time, that the technique of continuous cost analysis is sufficiently susceptible of standardization to warrant attempting to set up as complete a standard as the present Uniform System of Accounts. On the other hand, the major difficulties to be overcome are universal in principle and might well be investigated by some centralized committee. It would seem, therefore, that the major aspects of the problem might well be turned over to a full-time committee under the auspices of the Edison Electric Institute, the cost to be prorated among the benefiting utilities. Members of the committee should have a close knowledge of accounting as practiced in the utility industry, and elsewhere, and of the legal and technical aspects of the utility industry, and should, as well, be familiar with, and accept, the precepts of modern managerial philosophy. There is little reason to doubt that such a committee, by carefully investigating every phase of the problem and bringing analytical ability of a high caliber to bear on each, would be able to dissolve many of the difficulties which now bulk so large.

Yet, in the last analysis, the final refinement and practical application of such general principles as are evolved by the central committee will rest on the great body of utility accountants. The brunt of the task is theirs. It constitutes the greatest single opportunity for accountants to increase their usefulness to the utility industry and the greatest challenge to the ability of utility accountants. Its successful accomplishment will require a high degree of skill in the art of accountancy, a close acquaintance with the technical phases of the industry, and in a large measure, real administrative ability. Above all it requires a complete realization of the factual needs of management and the functions of accountancy as an integral part of management; in other words, the acquisition of the managerial viewpoint. There can be no doubt that once convinced of the need for a technique of continuous cost analysis as an integral part of utility accounting procedures, utility accountants will be able to devise and place in successful operation the necessary mechanisms to accomplish the desired end.

STUDY OF PERFORMANCE OF 6.6 TO 33 KV POWER LINES

As a part of the general program of the Joint Subcommittee on Development and Research in connection with higher voltage joint use, crossings, and low frequency induction, a critical analysis was made of a limited amount of carefully gathered data relating to the cause, frequency of occurrence, and effect of failures on wood pole lines in the voltage range from 6.6 to 33 kv. In accordance with this plan, the effect of construction details upon the performance and certain operating characteristics of different types of transmission lines in this voltage range, was investigated during 1930 and 1931 by Project Committee 2-G in cooperation with 12 power companies in the United States.

The companies which cooperated in this study were:

Alabama Power Company
Consumers Power Company
Dayton Power & Light Company
Detroit Edison Company
Duquesne Light Company
Niagara, Lockport & Ontario Power Company
Pennsylvania Power & Light Company
Philadelphia Electric Company
Public Service Company of Northern Illinois
Public Service Electric & Gas Company
Southern California Edison Company, Ltd.
Union Gas & Electric Company

Two or more transmission lines were selected by each of these companies for special observation during the two-year period for the purpose of studying the effects of different types of construction or of country transversed. From these companies the committee received information on 46 transmission lines including 53 circuits with a total pole line length of 640 miles. There were 42 circuits under observation for two years and 11 other circuits for only one year. Detailed surveys of these lines were made to show the types of poles involved in each line.

Following each line outage, a careful inspection of the line involved was made and at the one or more poles where trouble was located, detailed information of all evidence of damage was recorded, as well as a detailed description of each pole involved.

As far as practicable the data are classified in the Project Committee's report in such a way that a comparison may be made between structures which do not include features other than the particular construction features under investigation. Analyses from the standpoint of frequency of occurrence of structure failures due to lightning are made for the different pole head configurations and for such construction features as ground wires, crossarm braces, metal crossarms and steel structures in wood pole lines. The report also includes a study of damage to insulators, conductors or wood resulting from lightning failures and subsequent arcs. Structures adjacent to, as well as the structures sustaining dielectric failures, are studied on the basis of impulse flash-over rating.

The analysis has been extended to cover relations between the frequency of electrical failure of poles and the differences in arcing distances on these structures, and the related question of the occurrence of lightning flash-overs on structures in which maximum use is made of the available dielectric. This analysis has a bearing on the feasibility of avoiding some of the lightning failures, otherwise to be expected in a given type of line, by avoiding the use of pole head arrangements which reduce the insulation level of the line. It has a bearing also on the practicability of lightning-proof lines, using present general methods of line construction.

While this investigation covered a fairly wide field, it is evident that the effects of many factors which enter into the question of overall line performance could not be adequately covered.

The report containing the above study was submitted by Project 2-G at the last meeting of the Joint Subcommittee on Development and Research and approved as a Provisional Report. This report is available to member companies at 80 cents per copy.

PRIZES

to be administered by the

EDISON ELECTRIC INSTITUTE

AND AWARDED IN 1934

PRIZES TO INDIVIDUALS

For Papers on Subjects Relating to the Electric Light and Power Industry

BYLLESBY PRIZE . . *Accounting*

Cash prizes of $100, $50 and $25 donated by Byllesby Engineering and Management Corporation, in memory of Colonel H. M. Byllesby, for the three most meritorious papers showing How to Increase the Usefulness of the Accountant in the Electric Light and Power Industry.

FORBES PRIZE . . *Public Relations*

A cash award of $250 donated by Mr. B. C. Forbes, Editor, Forbes Magazine, for the most meritorious paper dealing with the subject of Public Relations in the Electric Light and Power Industry.

LINDEMANN PRIZE . . *Electric Cookery*

Cash prizes of $150, $100 and $50 donated by Mr. A. L. Lindemann, Vice President and General Manager, A. J. Lindemann and Hoverson Company, for the three most meritorious papers dealing with the Advantages of Electric Cookery for Domestic Purposes.

McGRAW PRIZE . . *Engineering*

Cash prizes of $250, $150 and $100 donated by Mr. James H. McGraw, Chairman of Board, McGraw-Hill Publishing Company, for the three most meritorious papers on any Engineering or Technical subject relating to the Electric Light and Power Industry.

RULES AND CONDITIONS OF CONTESTS FOR PRIZES TO INDIVIDUALS

Edison Electric Institute is eligible to enter the competition. No person is eligible to win two years in succession the identical prize or lower prize of the same award, but is eligible for a higher prize of that award. Papers must be the original work of the author or

property of the Edison Electric Institute and will be available for inspection at the General Offices of the Institute. The right is reserved to publish any paper entered in the contest.

The first page of the manuscript must give the following information:

Power Industry.

Electric Light and Power Industry.

RULES AND CONDITIONS OF CONTESTS FOR PRIZES TO INDIVIDUALS

Edison Electric Institute is eligible to enter the competition. No person is eligible to win two years in succession the identical prize or lower prize of the same award, but is eligible for a higher prize of that award. Papers must be the original work of the author or authors, prepared exclusively for this competition. Papers may be of any length, and pen-and-ink drawings or photographs suitable for reproduction may be included. Papers should be typewritten on one side only.

property of the Edison Electric Institute and will be available for inspection at the General Offices of the Institute. The right is reserved to publish any paper entered in the contest.

The first page of the manuscript must give the following information: the name of the prize for which the paper is submitted, title of paper, name of author, name and address of employing company, title or character of position and home address. One paper may not be submitted for more than one prize.

PRIZES TO COMPANIES AND INDIVIDUALS

For Accomplishments in Specified Activities

CHARLES A. COFFIN AWARD

Sponsored by the General Electric Company

A Gold Medal, known as the Charles A. Coffin Medal, will be awarded to the public utility operating company within the United States which, during the year 1933, has made a distinguished contribution to the development of electric light and power for the convenience and well-being of the public and the benefit of the industry. The company awarded the medal will also receive $1,000 for its employes' benefit or similar fund.

An invitation to all electric light and power companies in the United States to make presentations of their accomplishments during 1933 was extended in October 1933.

Complete details and registration forms for the Charles A. Coffin Award may be secured from the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

HUGHES AWARD

Domestic Electric Cookery Load

A cup donated by Mr. George A. Hughes, President, Edison General Electric Appliance Company, Inc., to the Company Member* of the Edison Electric Institute showing the greatest contribution to the development of the Domestic Electric Cookery Load, through promotion, or selling, or both, during the fifteen-month period, January 1, 1933, to March 31, 1934, and cash prizes totaling $1,000 to the individuals responsible for the achievement.

All entries for the Hughes Award must be forwarded by April 15, 1934, to the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

*All electric light and power companies which registered up to May 15, 1933, and company members of the Edison Electric Institute which registered on or before July 25, 1933, are eligible for the contest terminating on April 1, 1934.

MARTIN AWARD

Rural Electrification

A bronze plaque donated by Mr. Thomas W. Martin, President, Alabama Power Company, to the Company Member of the Edison Electric Institute showing the greatest contribution to the advancement of Rural Electrification (agricultural advancement within the company's territory due to uses of electricity, development of rural load, cooperation with other agencies, extension of rural lines, organization and plan for conducting rural electric development) during the calendar year 1933.

Complete details and registration forms for the Martin Award may be secured from the Commercial Department, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

Elaborate and costly exhibits are entirely unnecessary. The merit of an enterprise presented in papers or exhibits will be the prime factor in determining awards, without regard to the size of competing companies.

Papers and exhibits for 1934 prizes must be forwarded by April 1, 1934, except as otherwise stipulated, to the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

Winners will be announced and prizes awarded at the 1934 Convention of the Edison Electric Institute

PRIZE AWARDS COMMITTEE: George B. Cortelyou, James E. Davidson, Frank W. Smith, *Chairman*

McGraw Prize Paper

FUNDAMENTAL CONSIDERATIONS IN THE PREPARATION OF A POWER SYSTEM MASTER PLAN

By WALTER J. LYMAN

This paper won the 1933 First James H. McGraw Prize. Mr. Lyman is with the Duquesne Light Company, Pittsburgh, Pa.

Fundamentally, this is a world of ever-changing conditions, and it is inevitable that no enterprise can make uninterrupted progress without continuously adapting itself to the changing trends. Intelligent and unbiased planning for electric power systems was never more important than at the present time. The purpose of this paper is to point out some of the basic changes in trend which make careful analysis and proper readjustments essential to a continuation of the remarkable record of progress, stability and public service, and to discuss three of the most vital problems around which the whole fabric of future planning is woven. These three factors are Forecasting, The Relation between Load and System Capacity and the subject of Fixed Capital Replacement.

New developments and shifting demands, which in fact are part of the experience of nearly every industry, require constant attention. As an example, the raising of new capital can, in general, be justified only by prospective increases in earning power. Thus, during the period of rapid expansion, new money can be secured very easily, not only for extensions but also for replacements and improvements. As the rate of growth diminishes, additional capital is harder to secure and greater demand is placed on current revenues by deterioration and obsolescence requirements. These gradual changes in the proportions of the income statement should be largely foreseen and provided for.

During the period of rapid load increases the common error of over-estimating the coming year's load does not involve serious consequences because the additional capacity resulting will most certainly be needed a year or two later, and the increased efficiency will probably pay for most of the added fixed charges. This is not true after the load growth has dwindled and become more uncertain. In this case, surplus capacity resulting from over-optimism presents a more serious problem. Equipment units are probably of larger capacity and several years may easily be required to properly load one up, during which time the increase in efficiency, now much smaller, pays only a small portion of the fixed charges.

During the past 10 or 15 years, improvements in efficiency of electric systems (particularly in generating costs), together with the increase in size and load density, have made possible frequent substantial rate reductions, and this has gone far to discourage and practically eliminate most forms of competition. As physical and economic limits of efficiency are more closely approached, further reductions in cost of service will depend more on decreased unit investment costs, which in turn will require more attention to the standards of service and the proper relation between load and capacity. The investment per kilowatt of load has, in general, been increasing for many years, a trend which can be reversed only by the most careful coordination of future load, system capacity, income statement and balance sheet.

Another factor that will undoubtedly become of greater importance is the replacement of obsolete and inadequate equipment. During the last decade the load was increasing and additional equipment was being added so rapidly that apparatus more than 10 or 15 years old was only a small portion of the total fixed capital, and necessary replacements were dwarfed by comparison with current revenues. In the future, even though the useful life of equipment proves to be double what it has been in the past (a dubious possibility), the requirements for retirements will in time reach at least twice their present percentage of gross revenue. The prosperity of many an enterprise has been terminated by inadequate provisions for future replacements.

A determination to recognize these factors, as well as the many other advantages of systematic planning, will probably result in the preparation of some form of Master Plan. This plan will set forth the service requirements, basic engineering principles, general system layout, and a coordinated future plan to serve as a pattern for the development of the system, and also a logical financial program that will insure a proper balance between revenues, operating expenses, financial obligations and system improvements. The Master Plan, in its truest sense, does not include a detailed construction program, but acts rather as a guide for the preparation of the annual budget.

FORECASTING

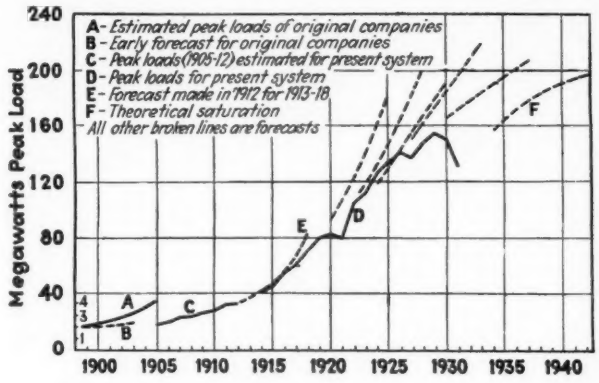
Long-range forecasting requires, more than anything else, an understanding of the law of inevitable change and the ability to project into the future and detect basic trends and new influences which are obscure or invisible in the present. It is largely by discovering or foreseeing conditions not generally realized and deviating from the popular outlook that long-range forecasting can be of real value and be the means of avoiding undermining influences. And by this same token, forecasting is made difficult through the necessity of properly discounting the trends established in the past and the uninformed or biased expectations for the future. It would almost seem that in many cases an accurate and *accepted* forecast (particularly if pessimistic) is necessarily self-destructive and impossible since the public knowledge of future conditions which is implied would bring into play opposing forces preventing consummation of the prediction. To the extent that this element enters the problem, it is necessary for the forecaster to "buck" public opinion and popular theories, and steer a true course guided by sound principles and the broad experience of Industry.

There are many adherents to the so-called "S" curve, or growth saturation theory, as applied to individual developments and industries. This "S" curve shows a very moderate rate of growth at the beginning, gradually increasing to a maximum at the halfway point, and then steadily decreasing as "Saturation"

is approached. Population growth and many developments in nature follow more or less closely along this type of curve. Commerce or Industry, however, taken as aggregates are practically certain, in a nation such as ours, to show a reasonably steady increasing trend generation after generation. Such is rarely true, however, in cases of individual enterprises. These are conceived to meet a new demand or, more often, to do some existing job better and more economically. Born as they usually are, at the expense of a superseded enterprise, they prosper over a limited period, only to be ultimately curbed through the development of newer and better methods by the same Progress which gave them birth. This is the story of inland water transportation giving way to the steam railroad, the rail development being blocked by the coming of the motor vehicle, and highway transportation losing in turn to—air transportation?

To a certain extent the Electric Light and Power business enjoyed a rapid growth by taking over the work already being done by agencies such as the steam and internal combustion engine, gas lights and furnaces, hand labor, etc. The Electric Companies have, however, gone considerably further and developed new fields for the sale of electric power, such as in the home. However, even in the domestic field, most electric appliances perform tasks formerly done by more arduous and less-efficient means. It is probably in the fields where entirely new uses have been introduced, that the most rapid expansion will occur during the next several years. Although the growth cycle of the Central Station Electric business will, due to its composite nature, undoubtedly extend over a longer period than for many more specialized enterprises, it can hardly be expected to continue indefinitely at the rate enjoyed during the last decade. A distinction which, in the future, may become more significant, must be made between (a) the use of electricity, and (b) the sale of electricity by Central Station Companies.

It is important to trace the changes in the popular expectation of future growth during the various stages of the development of an enterprise. At its inception the public is usually unwilling to admit the possibility of success. It is only through the vision and persistence of the pioneers that a meager start is made. Furthermore, it is probably true that even these earliest pioneers in their enthusiasm fall far short of the ultimate magnitude of the development actually realized after the talent of the engineering and commercial world has been brought to focus on its problems.



The Trend in Load Forecasting —Based on Actual Records

However, after the daring promoters have demonstrated the success of their ideas and the financial stability of the business, the public which had condemned it a few years before, now recognizes its merit, and assuming the prophetic task of the pioneer, characteristically allows its unbounded enthusiasm to picture an unlimited continuation of the rapid growth all out of proportion to the real prospects. After this stage of development has been reached, the long-range forecasts are quite likely to be too optimistic. A study of these tendencies is of utmost importance to the forecaster.

This theory regarding the probable trend in long-range forecasts is demonstrated in the case presented here by comparing predictions that have been made in the past with the actual loads which developed subsequently. The curves on Fig. 1 are taken from actual records and illustrate the principle graphically.

The earliest forecast available was made in December, 1898, predicting a three per cent increase in revenue the following year and new capital requirements for betterments and extensions of two per cent per year for a five-year period. It is quite evident that these men had no conception of the tremendous growth in store for the company. The reason may be partially explained by the fact that the increase in revenue for the two years prior to December, 1898, had averaged only 3.8 per cent per year. The actual increase in revenue for the next seven years was 14 per cent per year, and for the thirty years following 1898 was equivalent to over 13 per cent per year compounded!

The next forecast now available was made in 1912-13. After a very extensive analysis of past records and the probable future market, a prediction was made of the load growth from 1912 to 1918, as shown on the curve sheet. The first four years coincide very closely with the actual load, and it is only the last two years of the curve that subsequently proved to be too high. This conformity, in view of the fact that the program called for taking over a definite surveyed load by the end of the six-year period, and was probably intended to be optimistic, illustrates that this was the period in which the popular expectations of development for the several years following proved to be very nearly correct.

This attitude toward growth seems to have prevailed for the next five or six years, for even during the latter part of the World War when all plant facilities were loaded to their limit, the management was apparently very reluctant to invest large sums in additional capacity lest the conclusion of the war leave them with unnecessary equipment installed at abnormal prices.

The next forecast shown, however, made in 1921, proves that by this time the future outlook had swung from skepticism through realism to intense optimism. It envisioned a 15 per cent per year compounded growth, giving peak loads much greater than actually developed. From this point on, each succeeding forecast had to be revised downward to keep in step with the actual trend.

The 1927 forecast is the first one shown embodying the decreasing slope or "saturation" idea. At the time, this was considered a pessimistic outlook, although it is now evident that the spirit of optimism was still fundamental. The recent depression is not entirely responsible for these inaccuracies because these forecasts had shown their inadequacy prior to 1930. The last forecast shown

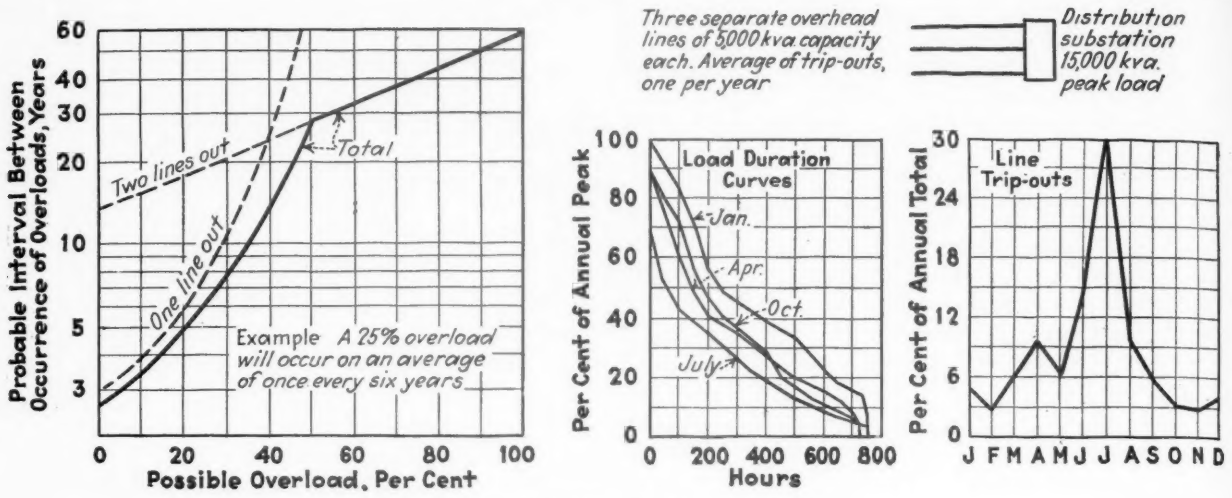

Probable Interval Between Occurrence of Overloads, Years
60
40
30
20
10
5
3
Two lines out
One line out
Total
Example A 25% overload will occur on an average of once every six years
0 20 40 60 80 100
Possible Overload, Per Cent
Three separate overhead lines of 5,000 kva capacity each. Average of trip-outs, one per year
Distribution substation 15,000 kva. peak load
Per Cent of Annual Peak
100 80 60 40 20 0
Load Duration Curves
Jan.
Apr.
Oct.
July
0 200 400 600 800
Hours
Per Cent of Annual Total
30 24 18 12 6 0
Line Trip-outs
J F M A M J J A S O N D

Fig. 2—Probability of Line Overloads

was obtained merely by applying mathematically a standard "S" curve to the past load data, allowing for assumed "depression periods," and does not necessarily reflect the prevailing opinion.

This review of prophecies and their sequel demonstrates the plight of the forecaster. Assuming that he had, throughout the entire history of this enterprise, correctly foretold the future, he would have, during the early stages, been ridiculed as a hopeless dreamer, and during the last decade, scorned as a meddlesome pessimist blocking the road of progress. Only during that comparatively brief period that came just prior to the time of most rapid growth would his statements have been generally accepted. But unfortunately this was the period during which accurate forecasts were easiest to make, being largely a projection of the past trend. Reliable forecasts would have been of much greater value during the early period, or during the last decade where they would have shown a change in trend and profitably altered the policies of the company.

It is unquestionably true that forecasting is a matter of great importance and a job requiring an unbiased viewpoint, long and diverse experience, and fearless foresight. It does not consist of the mere application of a formula or the extension of a curve, but should be contributed to by the best minds available in the company.

SPARE CAPACITY AND SERVICE CONTINUITY

A major problem in the design of a power system arises from a combination of the desire to render reasonably continuous service, and the inherent fallibility of equipment. A rather large proportion of the fixed capital is so occupied, and a careful analysis of the relation between load and capacity is the starting point in an effort to reduce cost of service. At the beginning of the last decade service continuity was not consistent with the greatest use of electric power. Consequently, reserve capacity for breakdowns has been steadily increased, while the failures have been greatly decreased by improvements in practically all component parts of the system. During this period the total duration of outages has in some cases been reduced 90 per cent. Research and development in the field of breakdowns will result in still greater equipment reliability, and new, or revised standards of spare capacity will be necessary. The remarkable operating record of oil-filled cable is interesting in this connection.

This subject involves to a large extent the science of probability. This does not necessarily imply a theoretical or highly mathematical calculation, or even a different line of reasoning. Experience has shown that breakdowns of varying frequency may be expected from different types of equipment in different locations, and the standards of spare capacity used in the past have in reality been "rule-of-thumb" probability solutions. It is evident that 100 per cent continuous service cannot in any case be guaranteed, but that this goal can be approached in a definite way by reducing the probability of outage. Probability is a vital element in the operation of the central station business as well as almost every phase of our existence, and has even been used to explain the fundamentals of intermolecular actions. Diversity on an electric system is largely due to the operation of probability.

It is suggested that a thorough study of equipment performance, normal variations in load, relative probability of different kinds of outages, and of service continuity at different points on the system will result in a better coordinated distribution of spare capacity from the generator to the consumer, and the best ultimate results for the minimum of cost. By comparison on a common basis, the cost of the reliability element in each section of the system can be determined and compared, resulting, for example, in preventing an undue investment to reduce outages on distribution circuits while the majority of the trouble may be in the transmission system and where better results might be secured by transmission improvements.

The first step would be to establish some rational set of service standards, presumably based on the known average performance at present and adjusted for the probable trend, special requirements, number and nature of complaints, etc. A good measure of service is the number of outages per year and the total duration (time of occurrence sometimes a consideration). The next step is to study the trend in the breakdown performance of each component part of the system and attempt to judge what may be expected in the future. This is quite important since improvements will probably be made that will change the whole aspect of certain transmission or distribution practices. This should be followed by an analysis of customer outages as they now occur and a determination

of the relative responsibilities of each subdivision of the system.

With information such as this as a basis, each improvement or addition to the system can be carefully weighed regarding the effect of alternate schemes on the probability of customer outages. When load growth begins to infringe on the percentage of spare capacity established as necessary in the past, new capacity should not be added until it has been shown that the probability of a customer outage or undesirable equipment overload is actually inconsistent with the rest of the system and the desired ultimate result. An example will be presented showing how the probability of overload could be studied in the case of a large substation supplied by overhead transmission.

The case selected is that of a hypothetical distribution station with a peak load of 15,000 kv.-a. supplied by three high tension lines of 5000 kv.-a. capacity each. These lines are each three miles long over different routes and, as shown by experience, may be expected to trip out on an average of once a year. The average length of outages has been 30 minutes, and in only 10 per cent of the cases do they run over two hours. These outages are due mainly to lightning occurring during the summer months. Experience is again consulted (Fig. 2) to show the normal seasonal variation in trip-outs. In direct contrast to this condition is the fact that the peak loads are much smaller in the summer. An analysis of the hourly, daily and seasonal variations in load shows that while the January peak is 15,000 kv.-a., the peak in July is only 10,000 kv.-a., and that throughout the year the load exceeds 10,000 kv.-a. only 11 per cent of the time.

Although a line outage at the time of the station peak would produce a 50 per cent overload on the two remaining circuits, it is very improbable, since most of the few hours during which the load exceeds the capacity of two lines occur during the seasons when lightning is infrequent or absent. These fundamental factors have been combined to show the probability of having overloads of various magnitudes and the results shown on Fig. 2. The probability of overloads due to simultaneous outages of two lines is included in this solution (determined as described below). Although the possibility of this at the time of the peak can be imagined, it is too remote for much consideration. With the three lines spaced an average of one-half mile

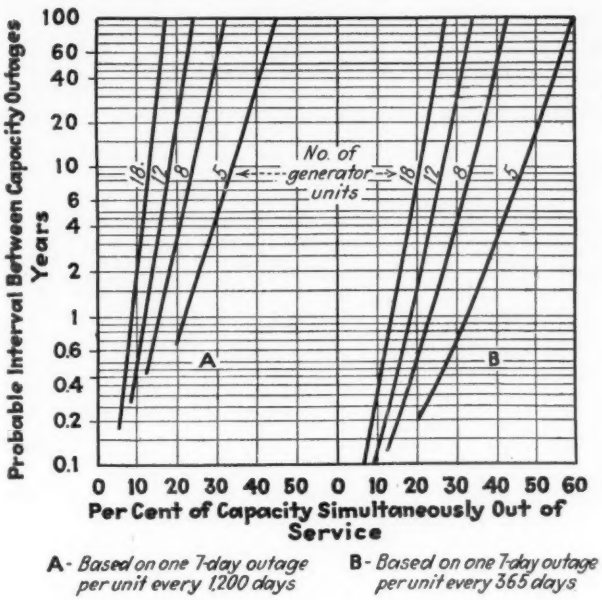


Fig. 3—Probability of Simultaneous Generator Outages

apart, experience shows that in only one case in 15 will two circuits be out together. And only 37 per cent of these would occur when the load is over 5000 kv.-a. (once in 13.5 years).

The conclusion reached from this study alone is that although the substation apparently has no spare transmission capacity, only once in 3.4 years would the line rating be exceeded by 10 per cent, and only once every six years would the overload reach 25 per cent. A study should be made of the effect of infrequent overloads on the various parts of the circuit to judge whether or not they are objectionable, and also if the potential hazard to service is out of line with the possible loss of power due to trouble at other places on the system. No definite conclusion should be reached until all pertinent factors have been given due consideration, but it is believed that probability studies such as this will be of great assistance in reducing unit investment without jeopardizing service.

Another sample of where a probability analysis can sometimes be applied to clarify the problem is in the case of simultaneous or overlapping generator outages from causes not common to both machines. This is particularly true where large interconnected systems are involved and the generating units are widely separated. A probability study would not embrace the possibility of several units, or even a whole power plant being shut down due to some major system trouble, but this does not detract from its value since it is seldom proposed to provide sufficient capacity to carry peak loads during such abnormal conditions which are usually of short duration. In many cases of this class, additional units would be of little value because if running at the time, they also would have been tripped off, and if idle, could not be put on the line as quickly as the ones that had been carrying the load.

Whether or not provision is made for the various contingencies, depends after all on the probable frequency of occurrence of such an event. There is very little question about providing for breakdown of one unit because this is known to occur quite often. Furthermore, reserve is usually installed for a double outage because experience has shown that this may occur every two or three years. However, very little money is spent in anticipation of a combination of breakdowns that may occur on an average of say once every twenty or thirty years.

The addition of a greater number of units to an interconnected system reduces the percentage loss in capacity resulting from any given outage, but it also increases the probability that such an outage will occur. The actual net gain in dependable capacity effected through interconnection can be calculated through probability.

The starting point for such a study is an analysis of the trend in generating unit breakdowns (regardless of overlapping) and the selection of an average frequency and duration for the period under discussion. By application

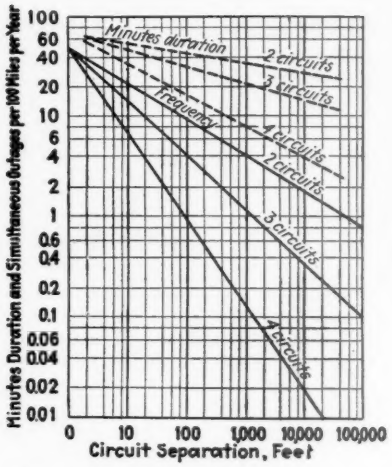


Fig. 4—Simultaneous Overhead Line Outages vs. Circuit Separation

of the laws of combinations, it is possible to calculate the relative probabilities of: no double outage during the average unit breakdown period, one double outage, one triple, two double outages, etc., for all possible combinations. A check of the accuracy is obtained through the fact that the sum of all the individual probabilities is unity. In order to illustrate the results that may be obtained, the problem has been worked out for two different assumed frequencies of breakdown. The one in Fig. 3-A is based on the average experience of 13 different companies. The curves show, for example, that with eight units, a double outage (25 per cent of capacity) would be expected on an average of once every 12 years. With 12 units, a double outage would occur every five years, but 25 per cent capacity (three units) would not be out oftener than every 100 years, due purely to chance overlapping. A comparison was made between the actual number of double outages experienced by two large companies over a 12-year period and the theoretical value as shown by the curves, and the discrepancy was only about 15 per cent.

In the case of overhead line outages, a probability study such as the above would have no value, due to the fact that most trip-outs occur during storms occupying a small percentage of the year and covering relatively small areas at any one time. However, the actual performance can be analyzed and the probable frequency of double outages determined as related to the separation of circuits. The result of such a study by one company is shown on Fig. 4. The relative improvement in service of different arrangements of lines can be better judged by the use of such data.

These suggestions and typical solutions have been outlined in the belief that the fundamentals of "probability" can become a valuable aid in the solution of many power system problems, particularly that of obtaining the greatest possible use from all capital investments.

ANALYSIS OF TREND IN FIXED CAPITAL REPLACEMENTS

The problem of replacing fixed capital, due both to deterioration and obsolescence, is a vital factor in the case of the electric light and power companies where the plant investment is so large compared with the gross annual revenues. Regardless of the policy on future financing, the existing plant can be kept intact only by diverting a portion of current revenues to compensate for necessary retirement of deteriorated and unsafe equipment and apparatus rendered obsolete by load growth, modern improvements or local reductions in demand for power.

The object of this discussion is to demonstrate that although revenue deductions for retirements have, up to the present time, been entirely adequate, they will increase considerably in the future, changing from a relatively unimportant matter during a period of rapid growth and substantial earnings to a serious and burdensome problem of management.

The magnitude of annual replacements will depend naturally on the effective useful life of all equipment involved. Another factor which has a great effect on the actual annual percentage replacement, is the rate of growth of the business. This is true for the reason that equipment installed during any given year will not be replaced until its useful life has elapsed in, say, 20 years. If the business has been growing consistently, it will be found that when the 20 years has elapsed, the fixed capital and the annual revenue will have reached possibly several times the original value. Due to this fact, the replacement of equipment installed 20 years prior can be financed with a very small percentage of the current revenues.

To illustrate with a concrete (and not unusual) example, assume the fixed capital has increased four times over the 20-year period. Then a retirement equal to 5 per cent of the original capital will be only 1¼ per cent of the present fixed capital, and with a capital ratio of six to one, 5 per cent of the original equipment now being replaced can be handled with 7½ per cent (6 x 1¼ per cent) of current revenues. In this manner the retirement program is always several years behind the growth, and the percentage retirement figure remains small. It has been shown by an authority on this subject*, that an average useful life of 20 years, combined with an annual growth of 10 per cent, will result not in a 5 per cent replacement, but only 1.8 per cent per year.

Naturally, if the business should cease to grow and the fixed capital and revenues should remain constant, the replacements would ultimately reach the figure of 5 per cent on the current fixed capital. With a capital ratio of six to one, this would mean that 30 per cent of the gross would be needed for retirements.

The following will be an attempt to develop, through a technical analysis of the problem over the entire history of one company, a theoretical long-range replacement curve and to so adjust the basic assumptions as to equipment life to give results for the past decade which correspond accurately with the actual experience. This analysis can then be extended into the future with reasonable assurance that the forecast furnishes a sound background based on principles and practices which have proved themselves during the past.

Reliable information relative to actual useful life is very difficult to obtain. A cursory investigation was made of power plant equipment which had been retired during the past. These figures ranged from three to 26 years, with an average of less than 10 years. The age of the generating units now in service ranges from two to 17 years. An investigation of the wood pole lines which have been rebuilt during the last several years showed an average life of about 15 years.

An accurate knowledge of the life of equipment during the past is not essential since depreciation rates in the future will certainly be quite different. The high mortality rates during the past have been due in a large measure to obsolescence brought about by improvements in equipment and rapid growth in the size of the system. In the future, equipment changes due to rapid growth will probably be less frequent. Although further improvements in efficiency of

*Dr. Philip Cabot—Prof. of Public Utilities, Harvard Univ.

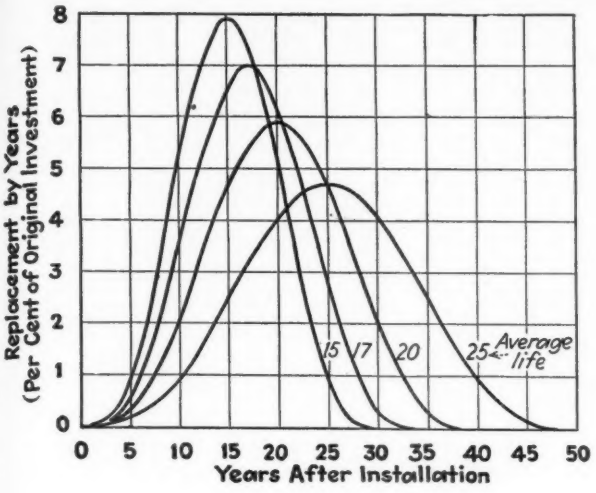


Fig. 5—Above—Standard Symmetrical Frequency Replacement Curves

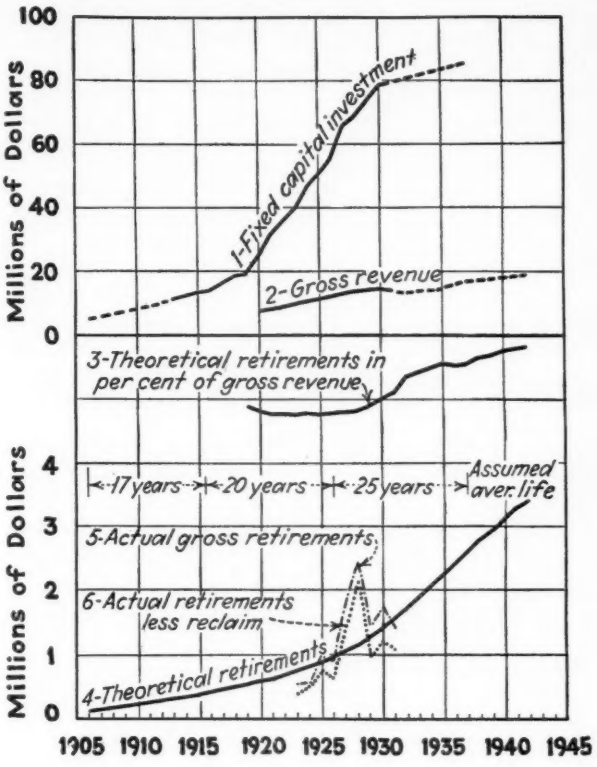


Fig. 6—Right—Analysis of Trend in Fixed Capital Replacements

new apparatus will not be as marked as in the past, the problem of obsolescence will still be very important even though less in magnitude and of a different nature. Progress is inevitable and changes must be made in any business in order to keep it healthy. This tendency has been recognized in the following analysis through the assumption of an increasing useful life.

In general, equipment is not replaced on a straight line depreciation rate. On the contrary, replacements during the first few years will be light, increasing in percentage to a maximum at approximately the average life, and decreasing thereafter until the last piece has been replaced. Experience curves showing this for various types of equipment are available. This case, however, deals with an aggregate of many different types of equipment from the power station to the customer's meter. Standard symmetrical replacement curves were selected as shown on Fig. 5 for several different values of average life. These curves show the percentage of the original investment which is replaced each year during the total life. These curves can be applied to the gross construction in any year to forecast the replacements by years thereafter.

The next step in carrying out this replacement analysis is to obtain a curve for fixed capital back to the origin of the company. It may be necessary to estimate arbitrarily the early portion of this record, but the accuracy of this assumption has little effect on the results during recent years.

If the true average life of equipment installed at all stages of the development were known, the curves on Fig. 5 could be applied to the net increases in the fixed capital curve of Fig. 6 to give the replacements thereafter. Consequently, reasonable values of average life were assumed and the corresponding replacement curve applied to the capital improvements for the first five years. Five-year increments were used to simplify calculation. This distributed the total construction for these five years over a period of about 30 years, ultimately replacing them entirely. The net construction for the next five years was then taken together with the replacements of equipment installed during the first five-year period. This gross construction was then distributed in accordance with the replacement curve.

In this way the net construction each year was added to the replacements, giving the total new equipment installed, which was distributed according to the replacement curve. The results of this process are shown by the theoretical replacement curve No. 4 in Fig. 6.

The next step in the process is very significant. Various values of average life were applied during the different parts of the program by the cut-and-try method until the theoretical replacements for the last nine years corresponded accurately with the actual total replacements during the same period. In this way the method and assumptions are checked up and made to correspond with actual experience. Projection of this curve into the future can then be done with some assurance that the result will be reasonable.

These figures will, of course, give a smooth curve of normal replacements, although the actual year-by-year replacements will depend largely on the construction program and will be apt to vary considerably from the normal trend. However, the average over a period of years should correspond. It is important to note that the solution in this case was obtained by assuming an average life of 15 years for all equipment installed prior to 1906; 17 years for equipment installed from 1906 to 1915; 20 years from 1916 to 1926, and 25 years thereafter. A 25-year average life of all equipment is believed to be conservative for the future. Experience in other industries seems to indicate that this useful life is almost too much to expect.

On Fig. 6 is shown a curve (No. 5) of actual retirements during the period 1923 to 1931. These retirements include a considerable amount of equipment which is retired from one location and returned to the storeroom to be used again. For example, a distribution transformer may be retired after two or three years in service due to load growth and be reinstalled at another location shortly. The same transformer might conceivably be retired four or five times during its useful life. This type of retirement does not represent the end of useful life and should be eliminated from the total.

Curve 6 on Fig. 6 shows the annual retirements reduced by the amount of reclaim to the storeroom. This eliminates the above-mentioned item and leaves equipment actually scrapped. However, reclaim to the storeroom is usually made at original cost and some of the equipment has depreciated considerably before being retired; consequently, the true representative of useful life is probably between the two above-mentioned curves. It can be seen that the solution has been so arranged that the theoretical replacements for the nine years will average less than the actual gross retirements, but somewhat higher than the actual net retirements after subtracting reclaim.

Another important check between actual and theoretical retirements was made by studying a group of accounts which contained only the equipment in service before 1919. No additions have been made to this account and all retirements from the original equipment have been deducted. The figures from the theoretical solution were found to check almost exactly with the actual amounts remaining in these accounts.

The amounts shown on Curve 4, Fig. 6, represent the equipment removed from service. However, the net cost of this retirement program varies only slightly from this figure since other factors such as Labor to Remove and Sale of Scrap tend to offset each other. The records bearing on this subject were carefully analyzed for the nine-year period. The return from the sale of scrap material was almost sufficient to pay for the cost of removal. Other items such as Material from Storeroom, Labor to Scrap and Other Expenses accounted for the relatively small net cost of removal (5 per cent of total retirements). In view of these figures, it was believed that the data on Curve 4 can be used as a forecast of the amount of money normally required for retirement reserve.

It would seem that the above solution to the problem is reasonably accurate and that the forecast for the next decade can be used as a fair index. Curve 3 on Fig. 6 shows the per cent of the gross revenue necessary to finance the replacements from Curve 4. The percentage generally used has been entirely adequate during the last ten years to cover the actual retirements. The significant fact, however, is the probable increase in this percentage in the next decade, making the replacement requirements a much more important item on the profit and loss sheet. It is obvious that failure to recognize this trend would gradually weaken the financial structure, seriously undermine ability to utilize new developments and meet growing competition and result in ultimate disaster.

The results of this study are believed to be fairly representative of the entire industry, and illustrate clearly the probable trend in fixed capital retirements during the next ten years. It is believed that this possibility should be considered along with other important elements in establishing any policy affecting the financial status of the company.

CONCLUSIONS

In discussing the comprehensive and vital problem of preparing a Master Plan, only some of the most important elements have been touched upon. It is believed that sound policies and a successful long-range development will result from close attention to the three fundamental problems outlined herein.

Courageous and unbiased forecasting based on broad experience is the starting point. The most valuable forecasts are those which recognize changes in trend not generally appreciated, and it is frequently necessary for the forecaster to run counter to public opinion, and with very little support.

The relation between capacity and load is an important element and has a powerful influence on the cost of service. It is suggested that a thorough analysis for the purpose of securing a more scientific correlation between load, capacity, service continuity, equipment reliability and overload capacity will result in a widespread reduction in unit investment without hazard to service. Some typical cases discussed illustrate how "probability" methods may be applied to make much more tangible the problem of service reliability and spare capacity.

Fixed capital replacement will be a vital factor in the future of the Central Station industry, and an analysis of this subject furnishes strong evidence that this requirement will some time become a much greater burden on the revenues than at present. The typical case presented gives an indication of the probable trend and illustrates how such a forecast might be made. This factor should be recognized in establishing financial policies that may be easily adjusted to the changing conditions.

The necessity of going over Central Station problems, trends and policies with a fine tooth comb and establishing a sound development plan is so vital that those entrusted with the management of the company should direct their attention to future planning. The preparation of a few curves and forecasts by specialized technicians isolated from management problems does not serve the purpose although it is a necessary ingredient. The importance of these problems is comparable with those of directing operation of the system, and the best judgment and experience in the company should be made available for their solution.

In the matter of achieving this result in the most economical manner, there are two schools of thought. In the smaller organizations particularly, good results can be secured through the committee system whereby a planning or development engineer with a few assistants receives the cooperation and support of all other departments. In the case of the larger organizations, it is usually felt that a separate and complete department is necessary to successfully carry along the many and diverse duties of planning. In any case, close contact must be maintained with the responsible leaders throughout the company, and enough authority and prestige vested in the planning group to not only "plan the work" but also to "work the plan."

Wanted—May Issues E.E.I. Bulletin

The May issue of the EDISON ELECTRIC INSTITUTE BULLETIN has been exhausted, and the Institute has received a number of urgent requests for copies for permanent files. The editor, 420 Lexington Avenue, New York, N. Y., will appreciate receiving copies of the May issue not wanted for reference use.

PLAYING SHERLOCK HOLMES WITH HIGH LIGHT BILLS

By J. D. LEWIS

District Manager, The Washington Water Power Company, Pullman, Wash.

An irate housewife, eyes blazing with a sense of injustice, stomps up to the counter, asks to see the manager, and with a voice full of indignation wants to know why her electric service bill was $11.50 last month. She says that Mrs. Smith next door had only a $9 bill; that they burned more current than she did; that the Smiths used a porch light; had numerous appliances, a large home, more lights—therefore her bill was too high and simply unreasonable. This scene, is one of the most disconcerting that can occur to a conscientious manager of a light and power office. Yet it is one that is enacted time and again, not only in my particular office, but in every public utility office in the land.

More than thirty years ago I went to work as an apprentice electrician. The magic wonder of electricity enthused those of us in the industry but it was the hardest kind of work to make people generally appreciate or recognize what could be done with it to their advantage.

As the adoption and use of electrical appliances became general, the average consumption and use of electrical energy increased, and the size of the average bill increased. But bills have not increased in proportion to the use of current, because of the improved efficiency of lamps and the rate reductions which have constantly taken place. With increased bills, with the publicity given utilities the last few years, and with reduced incomes was accentuated a problem long disturbing—the problem of high bill complaints.

To the small town manager this is the greatest problem he has. I suppose I have read thousands of pages in our electrical journals on how to handle complaints of high bills. I have talked to many in the public utility business. But after all there seems no set method to easily satisfy a customer who thinks his bill is more than it should be.

Not long ago a woman paying her bill of $6, complained, "I don't mind paying two or three dollars a month for mother and dad, but $6 is too much just for lights for two old people."

"Do they have any appliances?" I asked her.

"No," she said, "they haven't a thing. Mother even uses the old flat iron on the stove."

"Don't they use a toaster, percolator or an electric air heater?"

"No they do not. And they use the lights carefully and sparingly. I just can't understand it."

That the bill was a drain on her modest income was evident. I knew that the girl worked in a restaurant for small wages. I was disturbed and also sympathetic. So I called the service man.

"Go down there, check that meter carefully and look things over."

"But," he said, "Don't you remember we checked that place last year, and could not find a thing wrong with the meter or anything else. I don't know what they're doing, but they must be using the current for something."

Nevertheless he went and about an hour later he came in to see me, laughing.

"What did you find?" I asked.

"Heck," he said, "they have an air heater down there."

"How do you know?" I said. "The girl told me that they did not have any appliances."

"Well, I saw it. I checked the meter and wiring on the porch, and then knocked on the door and questioned them. Finally the old lady admitted they had an air heater. She said they kept it on day and night for a few days during that cold spell to keep things from freezing in the cellar."

Now of course this was the answer. Electric heating is nice; it's fine to take the chill off a breakfast room or bathroom for an hour or so, and used intermittently, it does not cost much. But burning twenty-four hours per day for three days, an electric heater would account for the extra size of her bill.

We had a call one morning just as we opened up. "I want you to send a man right out here to fix this meter. It's running all the time. No wonder my bills are so high." So the service man went. She met him at the door, complaining about her bills and our meters.

"It's running now, and there is no telling how high our bill will be," she said.

The service man, by loosing fuses, determined something was turned on, asked her to look around and went with her through the house. They could find nothing, so he said, "Have you lights in the barn?" She said they had, but was positive they were not turned on, because she had sent John out to make sure they were off before he went to work. She grudgingly yet confidently accompanied him to the barn. No lights were on downstairs, but as he climbed to the hay loft, there high on the rafters he saw burning a 100-watt lamp that John had used to find hay for the cow early that morning.

We get many high bill kicks, but so does every light and power office everywhere. These complaints are customary wherever continuous service is billed by the month, for the customer's memory is less accurate than that of the meter. The consumer, furthermore, may not always be on the premises or observant, whereas the meter is.

Yet the greatest share of customer complaints question the accuracy of the meter. The meter, they say, is "fast"; it registers more than has actually been used. We check hundreds of meters every year but find that instead of being "fast", as charged, they are actually slow.

Few watches become faster with age, neglect and dirt. Temperature changes, dust, lack of oil and infrequent inspection all tend to slow watches up, and meters act the same. In all my experience I have only found two or three "fast". Every experienced electrical man knows this and every meter tester is willing to gamble that the meter will be "slow" instead of "fast" or at least within two or three per cent of accuracy. Yet we become so moved by some customer's plea, and the amount he has used seems so unreasonably high after his explanation, that we do test his meter to satisfy ourselves as well as him of the facts. We are not always able to find what caused the high bill, and to prove to him what he did with the current

used. But neither are detectives always able to find the criminal or solve the mystery.

Last summer a prominent business man and his wife were ready for a trip to the coast. She turned on an electric plate to prepare breakfast but the burner did not heat. The electricity was off. Gathering their things they went to the restaurant and left from there on their trip. Ten days later they returned home to find the plate red hot and merrily churning kilowatt-hours on the meter. Their bill was about $25, as I remember it. We noticed the increase in current used and knowing that they had been away, could not account for it. When the collector presented the bill, the customer took it, wrote out the check, and then grimly yet humorously, like the good sport he is, told of his forgetting to turn the plate off before leaving the house.

We find people who refuse to help us locate what became of their kilowatt-hours. They won't tell us all the appliances they have, or truthfully picture the use of different electrical things they have installed. They claim they know how much they have used, that the bill is too high, and that our meter is the cause of the whole trouble.

How would you like to be confronted by this situation? After you have checked the premises and ascertained that the meter is correct, the customer still says, "Well I did not use all the current you have charged me with; I couldn't have used it. See for yourself; I have lights and a flat iron, a radio and nothing else. Figure it up, it simply was impossible for us to use that much electricity."

The customer owns the wiring, lights and appliances; we measure and sell him the electricity that is used at the entrance switch. Manifestly it should not be up to us to detect, a month afterward, what he did with it or how it was used or what became of it. You cannot see electricity gradually disappearing like the coal in the coal bin.

The custom of passing on to the power company to discover, analyze, and prove what the purchaser did with the kilowatt-hours consumed, is a tough assignment, yet this will continue until people generally realize how dependable and accurate electric meters really are. Most power companies will help consumers discover where they are wasteful of the current that each appliance is consuming. If, on the other hand, they refuse to take suggestions or do not work sympathetically and sincerely with us, we cannot do much for them.

So many people say, "I know I could not have used it." They name what they used during the month, and I am convinced that many of them sincerely and truthfully think they did not use all the current charged to them.

Now we have all had this experience: During the course of an enjoyable evening someone has said, "It's about time to go home, it's almost twelve o'clock."

"Twelve o'clock! Why it can't be possible," several exclaim. They take out their watches to verify the time. It is finally accepted as a fact. The watch, not subject to illusion, told the truth. If one could tell the time of day, there would be no need of clocks or watches. If one could tell how much current he used there would be no need for meters. You may think you're as accurate as the butcher, but even he doesn't trust his eye or hand. Neither do you.

If meters were notoriously fast and undependable, it would be generally known by those in the electrical business. It would be impossible to prevent this information from being broadcasted by authoritative sources. But this is not done and I have never yet read a statement, or heard of an authentic article, attacking the integrity and faithfulness of electric kilowatt-hour meters. We do hear about the broadcasting done by some person, who, according to the story as it comes to us, was away all month and returned to find his service bill just as big as ever.

One day, some years ago, a business man came into the office excitedly waving his electric service bill. In a loud voice full of vengeance that could be heard all over the office, he said. "I have heard stories time and again of your charging for electricity that was never used. I never really believed them, but now I am convinced. I know now that you are nothing but a band of robbers. Here is a bill for three dollars. My wife and children have been down to the lake for more than a month. I eat downtown. It's so lonesome and cheerless at home that I never go home till late. And even then seldom if ever turn on a light. The street lamp shines into my bedroom, and night after night I go to bed without using a light."

When he had cooled down somewhat, I said, "Let's go up and look things over; we'll run a stopwatch check on the meter, and see if there is anything turned on in the house." My inference that something was turned on riled him again. Vehemently he told how he had personally made sure no lights were left burning.

After the test proved the meter not at fault, we went through the house. We inspected every room and as I started down the basement stairs, he said, "There is nothing down there. You can see for yourself it's dark." But I snapped the lights on and looked around. Over in the far corner was a boxed enclosure.

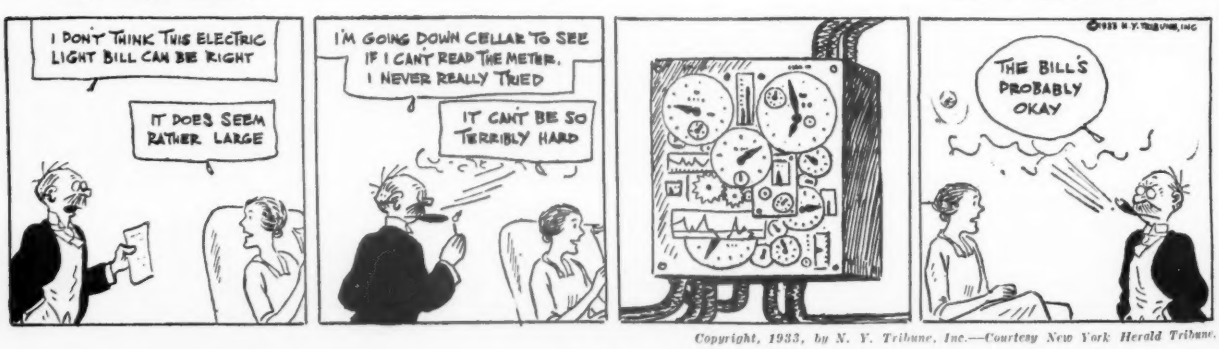
"What's that?" I asked.

"Oh, that's the fruit room, and there is no light on because no one has been in there since my wife left."

I wanted to be sure so I went over and opened the door. As I did, a stream of light shot into the dimly lighted basement. There in the center of the

(*Continued on Inside of Back Cover*)

Mr. and Mrs. ***Just to Make Sure***


I DON'T THINK THIS ELECTRIC LIGHT BILL CAN BE RIGHT
IT DOES SEEM RATHER LARGE
I'M GOING DOWN CELLAR TO SEE IF I CAN'T READ THE METER. I NEVER REALLY TRIED
IT CAN'T BE SO TERRIBLY HARD
THE BILL'S PROBABLY OKAY

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PAPERS ENTERED IN 1933 PRIZE CONTEST TO BE LOANED

The BULLETIN publishes below and on following pages a list of the papers and exhibits entered in the 1933 Prize Awards competition. With the exception of the prize-winning papers (which, so far as may be practicable, are to be published in the BULLETIN during the year), and the entries for the Curtis, Gilchrist and Martin Awards which may be inspected at the general offices, the Institute will be glad to loan to any member company or individual any of the papers listed. Application for loans of papers should be made to the secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y. Requests for loans will be filled in the order of receipt.

PRIZE WINNING PAPERS

H. M. Byllesby Prizes

First—V. Thiemann	Wisconsin Public Service Corp., Green Bay, Wis.	"Increasing the Accountant's Usefulness in the Public Utility Industry"
Second—Louis N. Rowley, Jr.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Increasing the Usefulness of the Accountant in the Public Utility Industry"
Third—Richard L. Fuller and Herman W. Bevis	Columbia Gas and Electric Corp., New York, N. Y.	"Increasing the Usefulness of the Accountant in the Public Utility Industry"

James E. Davidson Prizes

First—H. M. Sawyer	American Gas and Electric Co., New York, N. Y.	"Better Public Relations Through Systematic Personal Contacts"
Second—Gilbert K. Hardacre	Public Service Co. of Northern Illinois, Chicago, Ill.	"Profits from Outdoor Lighting"
Third—E. K. Leary	Alabama Power Co., Sheffield, Ala.	"The Five Year Plan"

Henry L. Doherty Prize

Gold Medal—Walter J. Lyman	Duquesne Light Co., Pittsburgh, Pa.	"Fundamental Considerations in the Preparation of a Power System Master Plan"

B. C. Forbes Prize

First—John M. Whittier	The Edison Electric Illuminating Co. of Boston, Boston, Mass.	"The New Demands of Changing Conditions"
Honorable Mention—Albert R. Stevens	West Penn Power Co., Pittsburgh, Pa.	"Design for Public Relations"

A. L. Lindemann Prizes

First—C. M. Baldwin	Minnesota Power and Light Co., Duluth, Minn.	"Why Electric Cookery is Best for Domestic Purposes"
Second—Hazel Auchmuty	Mississippi Power Co., Hattiesburg, Miss.	"The Advantages of Electric Cookery for Domestic Purposes"
Third—Florence Freer	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"I'll Believe Anything Now"

James H. McGraw Prizes

First—Walter J. Lyman	Duquesne Light Co., Pittsburgh, Pa.	"Fundamental Considerations in the Preparation of a Power System Master Plan"
Second—W. T. Crook, Jr. and G. S. Diehl	Safe Harbor Water Power Corp., Safe Harbor, Pa. Pennsylvania Water and Power Co., Baltimore, Md.	"Overcoming Danger from Transformer and Oil Circuit Breaker Fires"
Third—George C. Cook	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"The Development of a New Type Cinder Catcher for the Hudson Avenue Station"

PAPERS SUBMITTED BY THE FOLLOWING COMPANIES FOR THE CURTIS, GILCHRIST AND MARTIN AWARDS ARE AVAILABLE FOR INSPECTION AT THE EDISON ELECTRIC INSTITUTE

(This group won prizes or honorable mention)

Augustus D. Curtis Award

Certificate—Alabama Power Co., Birmingham, Ala.

Cash Award—J. S. Sutherland.

James M. Gilchrist Award

Medal—Sioux City Gas and Electric Co., Sioux City, Iowa.

Cash Award—C. R. Tracy.

Honorable Mention—Detroit Edison Co., Detroit, Mich.

Cash Award—T. F. Gessner.

Thomas W. Martin Rural Electrification Award

Plaque—Alabama Power Co., Birmingham, Ala.

(Other Entries for Curtis and Martin Awards)

Augustus D. Curtis Award

Potomac Electric Power Co., Washington, D. C.

Thomas W. Martin Award

Baton Rouge Electric Co., Baton Rouge, La.

Narragansett Electric Co., Providence, R. I.

Public Service Co. of Northern Illinois, Chicago, Ill.

PAPERS WHICH WILL BE LOANED TO MEMBERS

Submitted by	*Employed by*	*Title of Paper*
Adams, B. R. S.	Alabama Power Co., Huntsville, Ala.	"Public Relations in the Electric Light and Power Industry"
Akins, Harold C.	New York Power and Light Corp., Corinth, N. Y.	"Public Relations of Public Utilities"
Ankenmann, J. W.	Northwestern Public Service Co., Huron, S. D.	"Space Cooling"
Arthur, W. E.	General Electric Co., Schenectady, N. Y.	"Public Relations in the Electric Light and Power Industry"
Auger, Oscar A.	Malden Electric Co., Malden, Mass.	"Better Public Relations"
Bacon, Robert M.	Northern States Power Co., St. Paul, Minn.	"Increasing the Usefulness of the Accountant in the Public Utility Industry"
Barrow, Lester George	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"An Outline of Public Relations"
Barry, John J.	Edison Electric Illuminating Co., Boston, Mass.	"A Commercial Advertising Plan that Worked in Getting More Business Revenue in 1932"
Beaubier, David H.	Public Service Co. of Northern Illinois, Chicago, Ill.	"Public Relations in the Electric Light and Power Industry"
Berg, Camillo	United Electric Light and Power Co., New York, N. Y.	"A Study of Employee Training"
Bergaus, William	Northern States Power Co., St. Paul, Minn.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Bergmann, Walter and Henry G. Wingardner	New York Edison Co., New York, N. Y.	"Taxation and the Accountant"
Bergmann, Walter and Henry G. Wingardner	The New York Edison Co., New York, N. Y.	"The Usefulness of the Accountant in the Financing of Public Utilities"
Binford, R. J.	General Electric Co., Philadelphia, Pa.	"A Plan to Increase the Sale of Electrical Devices and Domestic Consumption of Energy"
Bitterli, John A.	Commonwealth Edison Company, Chicago, Ill.	"Keep Your Own Affairs in Order and Clean Before Trying to Tell or Force Others to Do So"
Boyajian, Mary M.	New York and Queens Electric Light and Power Co., Long Island City, N. Y.	"Electric Cookery"
Braswell, Ira	Kentucky Utilities Co., Winchester, Ky.	"Advantages of Electric Cookery for Domestic Purposes"
Bredehoeft, Evadna	Iowa-Nebraska Light and Power Co., Lincoln, Neb.	"The Promotion of Electric Service and Merchandise Sales"
Butler, John H.	New York Power and Light Co., Delmar, N. Y.	"Problems of Machine Accounting"
Butterfield, Ralph	Union Gas and Electric Co., Cincinnati, Ohio	"A New Era"
Byers, Marion F.	Public Service Co. of Indiana, Vincennes, Ind.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Carson, Robert	Oklahoma Gas and Electric Co., Guthrie, Okla.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Carson, Robert	Oklahoma Gas and Electric Co., Guthrie, Okla.	"Public Relations in the Electric Light and Power Industry"
Cashman, William J. and Fred S. Hoefer	Associated Gas and Electric System, Geneva, N. Y.	"Controlling Public Relations Through Action by New Business Departments"
Champaign, Geraldine K.	Cortland County Traction Co., Cortland, N. Y.	"Advantages of Electric Cookery for Domestic Purposes"
Champaign, Geraldine K.	Cortland County Traction Co., Cortland, N. Y.	"Public Relations"
Champaign, Geraldine K.	Cortland County Traction Co., Cortland, N. Y.	"Your Company and Mine"
Chesser, Carolyn	Potomac Electric Power Co., Washington, D. C.	"Advantages of Electric Cookery for Domestic Purposes"
Clute, George	Associated Gas and Electric Co., Patchogue, N. Y.	"The Advantages of Electric Cookery for Domestic Purposes"
Collier, William A.	Oklahoma Gas and Electric Co., Oklahoma City, Okla.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Collins, Edna M.	Key West Electric Co., Key West, Fla.	"The Advantages of Electric Cookery for Domestic Purposes"
Conroy, Joseph M.	United Electric Light and Power Co., New York, N. Y.	"Utility Aspirations in Its Public Relations"
Coombs, Leroy	Central Maine Power Co., Belfast, Maine	"A Better Way"
Cooper, W. S. and P. H. Hardie	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Appraising Condenser Performance with Regard to Tube Fouling"
Croft, John E.	General Electric Co., Philadelphia, Pa.	"Commercial and Merchandising Problems of the Electric Light and Power Industry to Promote Electric Service and Merchandise Sales"
Davis, H. A.	Texas Power and Light Co., Paris, Tex.	"Goodwill and the Electric Industry"
Decker, Virginia E.	Virginia Electric and Power Co., Norfolk, Va.	"How Will the Public Utilities Meet the Present Emergency"
DeWitt, Ralph B.	Virginia Public Service Co., Alexandria, Va.	"Simplification of Domestic Rate Structures"
Dolan, Louis E.	Commonwealth Edison Co., Chicago, Ill.	"There Came a Child . . . ."
Dorszynski, Esther A.	Milwaukee Electric Railway and Light Co., Milwaukee, Wis.	"Another Renaissance"
Dowler, Emma K.	Duquesne Light Co., Pittsburgh, Pa.	"Contributions of the Electric Utility Industry to the Advancement of Society"
Dryer, Alice M.	Fulton Light, Heat and Power Co., Fulton, N. Y.	"The Advantages of Electric Cookery for Domestic Purposes"
Eastridge, A. F.	Nebraska Power Co., Council Bluffs, Iowa	"Utility Merchandising"
Edwards, Kirkwood S.	New York Edison Co., New York, N. Y.	"Indirect and Direct Consumer Contact—Its Effect on Public Relations"
Eifert, Joseph F.	Otter Tail Power Co., Jamestown, N. D.	"Public Relations in the Electric Light and Power Industry"
Ellsworth, Bertram E.	Iowa-Nebraska Light and Power Co., Lincoln, Neb.	"Efficient Transmission Lines"
Emmer, Ruth A.	Potomac Electric Power Co., Washington, D. C.	"Advantages of Electric Cookery for Domestic Purposes"
Falk, Leslie A.	United Power and Light Corp., Abilene, Kan.	"Electric Cookery Scores a Grand Slam"
Ferguson, Frances E.	Gulf States Utilities Co., Lake Charles, La.	"The Advantages of Electric Cookery for Domestic Purposes"

Submitted by	*Employed by*	*Title of Paper*
Fruend, H. L.	Fargo Engineering Co., Jackson, Mich.	"Giving the Public a Square Deal"
Germain, Janet	Southern California Edison Co., Ltd., Santa Monica, Cal.	"The Advantages of Electric Cookery for Domestic Purposes"
Geyer, Jr., Charles F.	Buffalo General Electric Co., Buffalo, N. Y.	"The Advantages of Electric Cookery for Domestic Purposes"
Gifford, Laurence S.	Syracuse Lighting Co., Inc., Syracuse, N. Y.	"How to Increase the Usefulness of the Accountant in a Public Utility Industry"
Gillies, J. F.	Southern California Edison Co., Ltd., Los Angeles, Cal.	"Public Relations in the Electric Light and Power Industry"
Gills, J. P.	Appalachian Electric Power Co., Bluefield, W. Va.	"Why Electric Rates Cannot Fluctuate in Company with Other Commodity Prices"
Godwin, Francis K.	Oklahoma Utilities Co., Fairfax, Okla.	"Every Employee an Ambassador"
Googins, Hallett	New Bedford Gas and Edison Light Co., New Bedford, Mass.	"Give Us a Break"
Gorman, Edd	Kansas City Power and Light Co., Kansas City, Mo.	"Public Relations in the Electric Light and Power Industry"
Gray, Pearl	Niagara Electric Service Corp., Niagara Falls, N. Y.	"The Advantages of Electric Cookery for Domestic Purposes"
Greisser, Arthur H.	Portland General Electric Co., Portland, Ore.	"Competitive Aspects of the Diesel Engine"
Habig, Frank Paul	Public Service Electric and Gas Co., Newark, N. J.	"Public Relations in the Electric Light and Power Industry"
Hall, Roy V.	San Joaquin Light and Power Corp., Fresno, Calif.	"Banking of Transformers to Serve Mixed Three Phase and Single Phase Loads"
Hardie, P. H. and W. S. Cooper	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Appraising Condenser Performance with Regard to Tube Fouling"
Harris, Franklin L.	New York Edison Co., New York, N. Y.	"The Rate Schedule—Its Effect on Public Relations"
Hauwiller, Alfred A.	Northern States Power Co., St. Paul, Minn.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Hawkins, George E.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"The Consumer is Right"
Heiney, Theodore P.	New Jersey Power and Light Co., Tatamy, Pa.	"The Advantages of Electric Cookery for Domestic Purposes"
Hieronymus, J. Harold	Kentucky Utilities Co., Inc., Lexington, Ky.	"Advantages of Electric Cookery for Domestic Purposes"
Hinebaugh, Paul	Associated Gas and Electric Co., Oakland, Md.	"Advantages of Electric Cookery for Domestic Purposes"
Hoefer, Fred S. and William J. Cashman	Associated Gas and Electric Co., Geneva, N. Y.	"Controlling Public Relations Through Action by New Business Departments"
Hoeschen, Rudolph J.	Northern States Power Co., St. Cloud, Minn.	"How to Increase the Usefulness of the Accountant in The Public Utility Industry"
Holmes, H. A.	Monongahela West Penn Public Service Co., Fairmont, W. Va.	"Budget Control of Operating and Maintenance Expenditures"
Hoover, Veryl N.	Mountain States Power Co., Albany, Ore.	"Public Relations in the Electric Light and Power Industry"
Hover, Ernest W.	Central Hudson Gas and Electric Corp., Poughkeepsie, N. Y.	"Voltage Regulation on the Electric Distribution System"
Howe, Edward S.	United Electric Light and Power Co., New York, N. Y.	"The Tremendous Opportunity Offered by Changeover"
Hunsley, Charles	Calgary Power Co., Ltd., Calgary, Alberta, Can.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Hussong, Herbert O.	California Oregon Power Co., Medford, Ore.	"Measurement of the Merchandise Department"
Jahn, Clara Frances	Northern States Power Company, Montevideo, Minn.	"The Advantages of Electric Cookery for Domestic Purposes"
Jansen, Herman C.	New York Edison Co., New York, N. Y.	"Method to Promote the Sale and Use of Electrical Appliances for Household Cookery"
Johnson, Bert Y.	Louisville Gas and Electric Corp., Louisville, Ky.	"Public Relations"
Johnson, David R.	Central Power and Light Co., Mission, Texas	"Power and the Public"
Johnson, Frank F.	New York Power and Light Corp., Albany, N. Y.	"Multiphase Accounting Service"
Johnson, Jr., George B. and Ingolf Kvamme	Duquesne Light Co., Beaver Falls, Pa.	"How to Increase the Usefulness of the Accountant in Operating Departments"
Johnson, Howard L.	Pacific Gas and Electric Co., Oakland, Cal.	"Public Relations in the Electric Light and Power Industry"
Johnson, W. D.	Northern States Power Co., St. Paul, Minn.	"How to Increase the Usefulness of the Accountant in Public Utility Departments"
Jones, Eleanor	Southern California Edison Co., Ltd., Los Angeles, Cal.	"Advantages of Electric Cookery for Domestic Purposes"
Jordan, Seth N.	Interstate Power Co., Decorah, Iowa	"Public Relations"
Kelley, George E.	Portland General Electric Co., Portland, Ore.	"Advantages of Electric Cookery"
Kelly, Harold V.	United Electric Light and Power Co., New York, N. Y.	"Advantages of Electric Cookery for Domestic Purposes"
King, John E.	New York and Queens Electric Light and Power Co., Long Island City, N. Y.	"Better Internal Coordination—Better Public Relations"
Kirby, Arthur	Associated Gas and Electric Co., Warren, Pa.	"The Advantages of Electric Cookery for Domestic Purposes"
Kirk, Ralph L.	Duquesne Light Co., Pittsburgh, Pa.	"The House of Good Relations"
Knotts, Ralph	Mountain States Power Co., Albany, Ore.	"Increasing the Usefulness of the Accountant in the Public Utility Industry"
Krueskamp, William	Lexington Utilities Company, Lexington, Ky.	"The Advantages of Electric Cookery for Domestic Purposes"
Kvamme, Ingolf and George B. Johnson, Jr.	Duquesne Light Co., Beaver Falls, Pa.	"How to Increase the Usefulness of the Accountant in Operating Departments"

Submitted by	*Employed by*	*Title of Paper*
Lauffer, William G.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Centralized Combustion Regulation at Hudson Avenue Generating Station"
LeClair, T. G.	Commonwealth Edison Co., Chicago, Ill.	"Coal, Water and Electricity"
Leibman, George J.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"A Successful Load Building Plan"
Leider, Lloyd L.	Northern States Power Co., St. Paul, Minn.	"A Definite Stride Towards Bettered Public Relations"
Lein, Alma	Northern States Power Co., Eau Claire, Wis.	"The Advantages of Electric Cookery for Domestic Purposes"
Lemly, W. S.	Texas Power and Light Co., Dallas, Tex.	"Servants of Humanity"
Lewis, W. W.	General Electric Co., Schenectady, N. Y.	"The Coordination and Protection of Insulation"
Locknane, A. L.	Kentucky Utilities Co., Winchester, Ky.	"The Advantages of Electric Cookery for Domestic Purposes"
Maerkle, George C.	Cleveland Electric Illuminating Co., Cleveland, Ohio	"The Advantages of Electric Cookery for Domestic Purposes"
Markham, R. L.	New York Power and Light Corp., Albany, N. Y.	"Is Our Business So Different?"
Marston, Anson D.	Kansas City Power and Light Co., Kansas City, Mo.	"Rate Forms as They Affect Public Relations"
Martin, George J.	Pacific Gas and Electric Co., San Francisco, Cal.	"The Foundation of Public Relations"
Martin, George J.	Pacific Gas and Electric Co., San Francisco, Cal.	"The Relations of Government and Business"
Mathews, Hammond	Western Colorado Power Co., Silverton, Colo.	"Public Relations in the Electric Light and Power Industry"
Mathews, Hammond	Western Colorado Power Co., Silverton, Colo.	"Pole Replacements"
Mathews, Hammond	Western Colorado Power Co., Silverton, Colo.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Mayoral, Joaquin M. and Robert J. Murphy	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Maintaining Economy of Operation in a Large Central Station"
McChesney, Fred W. and Willard V. Merrihue	General Electric Co., Schenectady, N. Y.	"The Midget Load-Building Plan for Promoting an Industrial Heating Load"
McGill, Mrs. Lillian	Twin State Gas and Electric Co., St. Johnsbury, Vt.	"The Advantages of Electric Cookery for Domestic Purposes"
McGrath, William J.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
McKenna, C. A.	Menominee and Marinette Light & Traction Co., Menominee, Mich.	"How to Increase the Usefulness of the Accountant in the Public Utility Field"
Merrihue, Willard V. and Fred W. McChesney	General Electric Co., Schenectady, N. Y.	"The Midget Load-Building Plan for Promoting an Industrial Heating Load"
Meyer, Nicolas	Cia Cubana de Electricidad, Havana, Cuba	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Meyers, Wilson S.	Atlantic City Electric Co., Atlantic City, N. J.	"Electric Rates"
Mikulski, John J.	Buffalo General Electric Co., Buffalo, N. Y.	"Electric Cookery"
Miller, Lloyd Ira	Pennsylvania Power and Light Co., Allentown, Pa.	"Electric Cookery—A Modern Aid to Better Housekeeping"
Moore, C. Rea	Washington Water Power Co., Okanogan, Wash.	"Public Relations"
Moore, Elizabeth J.	Carolina Power and Light Co., Asheville, N. C.	"Why Not a Range for Leisure Hours?"
Muir, J. W.	Alabama Power Co., Birmingham, Ala.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Murphy, Robert J. and Joaquin M. Mayoral	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Maintaining Economy of Operation in a Large Central Station"
Muzzy, Alexander	Ohio Edison Co., Akron, Ohio	"Public Relations in the Electric Light and Power Industry"
Muzzy, Alexander	Ohio Edison Co., Akron, Ohio	"Relating to the Electric Light and Power Industry"
Muzzy, Alexander	Ohio Edison Co., Akron, Ohio	"Promoting Electric Service"
Noest, John G. and Leon P. Zeglio	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"The Electrical Maintenance System in the Hudson Avenue Generating Station of the Brooklyn Edison Company"
Ohrn, Carl T.	Cape and Vineyard Electric Co., Hyannis, Mass.	"The Advantage of Electric Cookery"
Park, G. E.	General Electric Co., Charlotte, N. C.	"Lighting for Easy Vision as Applied to Textile Plants"
Peters, William A.	Kentucky Utilities Co., Winchester, Ky.	"Electric Cookery"
Pieryear, Pearl	Kentucky Utilities Co., Campbellsville, Ky.	"The Advantages of Electric Cookery for Domestic Purposes"
Pilkington, John H.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Stock Control an Essential Factor in Balanced Purchasing"
Purdon, Carl	Kentucky Power and Light Co., Maysville, Ky.	"The Advantages of Electric Cookery for Domestic Purposes"
Ragle, Logan, Jr.	Southern Colorado Power Co., Pueblo, Colo.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Read, George J.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Collation of Long Term Forecasting Methods"
Redeen, A. R.	Wisconsin Public Service Corp., Milwaukee, Wis.	"Budgets—the Measuring Sticks of the Public Utility Industry"
Rees, Mrs. Jeanette I.	Southern California Edison Co., Ltd., Los Angeles, Cal.	"The Public Utility Woman — A Public Relations Asset"
Reis, Anthony J.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Fuse Adapter"
Reis, Anthony J.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"Fuse Amperage Identification by Colors"
Rhodehouse, Wm. J.	Public Service Electric and Gas Co., Englewood, N. J.	"Cooperation in the Commercial Department"

Submitted by	*Employed by*	*Title of Paper*
Richardson, Walter B.	Gulf States Utilities Co., Beaumont, Tex.	"Advantages of Electric Cookery for Domestic Purposes"
Ridley, A. V.	Kentucky Power and Light Co., Maysville, Ky.	"The Advantages of Electric Cookery for Domestic Purposes"
Riebeling, Magnus G.	Portland General Electric Co., Portland, Ore.	"Public Relations"
Robinson, Effie R.	Texas-Louisiana Power Co., Farmersville, Tex.	"The Advantages of Electric Cookery for Domestic Purposes"
Roehl, O. C.	Wisconsin Public Service Corp., Green Bay, Wis.	"Public Utility Employee Information Plans and Outlines of Public Utility Problems"
Schaefer, J. Philip	Potomac Electric Power Co., Washington, D. C.	"Merchandising Power Analysis of a Typical Case"
Schweitzer, George	Interstate Light and Power Co., Galena, Ill.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Shaffer, S. J.	General Electric Co., West Lynn, Mass.	"The Accountant's Function in a Cost Reduction Program"
Shaw, Ida	Illinois Northern Utilities Co., Dixon, Ill.	"Public Sentiment is Everything"
Short, James W.	Northern States Power Co., St. Paul, Minn.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Siegenthaler, R. F.	Northwestern Electric Co., Portland, Ore.	"Public Relations in the Electric Light and Power Industry"
Sieurin, Alf E.	Worcester Electric Light Co., Worcester, Mass.	"Public Relations in the Electric Light and Power Industry"
Skeen, J. H.	Public Service Co. of Colorado, Denver, Colo.	"Economic Aspects of the Electric Line Extension Problem"
Skogerson, E. O.	Northern States Power Co., Minneapolis, Minn.	"Public Relations"
Skrotzki, Bernhardt G. A.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"A Method of Analyzing Central Station Performance"
Slater, J. W.	Utah Power and Light Co., Salt Lake City, Utah	"Public Relations in the Electric Light and Power Industry"
Smith, T. Edgar	Malden Electric Co., Malden, Mass.	"Super Accounting"
Smith, Harry B.	Buffalo, Niagara and Eastern Power Corp., Buffalo, N. Y.	"Rent Factor"
Smith, S. A., Jr.	Public Service Electric & Gas Co., Newark, N. J.	"Probability Theory and Spare Equipment"
Smith, Theodore H. and Max J. Steinberg	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"The Theory of Incremental Rates and Their Practical Application to Load Division"
Spence, Frank M.	Oklahoma Gas and Electric Co., Oklahoma City, Okla.	"Increasing the Usefulness of the Accountant to the Utility Industry"
Stabley T. C.	Pennsylvania Water & Power Co., Holtwood, Pa.	"Modernizing Water Wheels of Pioneer Design"
Starrett, Luster L.	Commonwealth Edison Co., Chicago, Ill.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Steinberg, Max J. and Theodore H. Smith	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"The Theory of Incremental Rates and Their Practical Application to Load Division"
Stelle, R. Westbrook	Staten Island Edison Corp., New Brighton, S. I.	"Prize Speaking Contests and Their Influence on Employee Education and Public Relations"
Stermer, H. G.	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Stortz, Jr., F. A.	General Electric Co., Schenectady, N. Y.	"Research in Public Relations"
Tatem, Damon M.	Virginia Electric and Power Co., Portsmouth, Va.	"Electricity's Part"
Tegen, A. F.	Milwaukee Electric Railway and Light Co., Milwaukee, Wis.	"That All May Know"
Trimble, Alfred W.	Mountain States Power Co., Albany, Ore.	"Increasing the Usefulness of the Accountant in the Public Utility Industry"
Vail, Mary	Iowa Electric Light and Power Co., Cedar Rapids, Iowa	"The Advantages of Electric Cookery for Domestic Purposes"
Warren, Charles H.	Northern States Power Co., St. Paul, Minn.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Warsaw, Charles E.	Luzerne County Gas and Electric Corp., Kingston, Pa.	"Utility Relations with the Public in Trying Times"
West, William C. F.	Los Angeles Gas and Electric Corp., Los Angeles, Cal.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Williams, Robert S.	United Gas Improvement Co., Philadelphia, Pa.	"The Servicing of Electrical Appliances and its Effect on Public Relations"
Wingardner, Henry G. and Walter Bergmann	New York Edison Co., New York, N. Y.	"Taxation and the Accountant"
Wingardner, Henry G. and Walter Bergmann	New York Edison Co., New York, N. Y.	"The Usefulness of the Accountant in the Financing of Public Utilities"
Winn, J. F.	Northern States Power Co., Mankato, Minn.	"How to Increase the Usefulness of the Accountant in the Public Utility Industry"
Wise, Mrs. O. C.	Virginia Public Service Co., Harrisonburg, Va.	"How Will the Public Utilities Meet the Present Emergency?"
Wren, John Gilbert	Commonwealth Edison Co., Chicago, Ill.	"No Fuelin"
Young, Robert F.	Philadelphia Co., Pittsburgh, Pa.	"Public Relations in the Electric Light and Power Industry"
Youngsteadt, R. W.	Tennessee Electric Power Co., Chattanooga, Tenn.	"Profitable Leisure"
Zeglio, Leon P. and John G. Noest	Brooklyn Edison Co., Inc., Brooklyn, N. Y.	"The Electrical Maintenance System in the Hudson Avenue Generating Station of the Brooklyn Edison Company"
Zufall, Elizabeth L.	New York and Queens Electric Light and Power Co., Long Island City, N. Y.	"Electric Cookery"

POWER SALES ITEMS

Petroleum Electric Power Club

The meeting of the Petroleum Electric Power Club to be held at the Oklahoma Biltmore Hotel, Oklahoma City, Nov. 16-18, promises to uphold the high standards previously set for such meetings. While the complete program is not available at the time of going to press, the following items, which have already been decided upon, indicate the worth while nature of the meeting:

Mr. Edwin Vennard, commercial manager of the Southwestern Gas & Electric Company, Shreveport, La., will present a paper on "Oil Production Problems." This will cover the application of electric power to drilling, deep well pumping and other subjects of interest in the production field.

Mr. A. R. Watson, power engineer of the Gulf States Utility Company, Beaumont, Texas, will cover the subject of "Purchased Power for Refineries."

Mr. W. H. Stueve, Oklahoma Gas & Electric Company, Oklahoma City, Okla., will present a report, "Achievements in Electrification of Pipe Lines," covering particularly the recent electrification of the Great Lakes Pipe Line and the Phillips Pipe Line. He will also discuss the present-day economics of pumping.

In addition to the above, considerable time will be devoted to discussion of the progress made in the formation of standard rate forms, contracts and line extension agreements. A particularly valuable part of the meeting will be the round-table discussion of problems confronting those present.

Those desiring more complete information may write D. C. McKee, chairman, Petroleum Electric Power Club, Joplin, Mo.

AIR CONDITIONING

"Flexibility a Feature of Completely Conditioned Philadelphia Saving Fund Society Building," J. M. Dowling. Heating, Piping and Air Conditioning, August, 1933, pp. 409-12. Engineering Publications, Inc., publishers, 1900 Prairie Avenue, Chicago, Ill.

Description of air conditioning system of recently completed 34-story building; zoning of system to hold sliding scale; special outlets handle low-temperature air; evaporative cooling conserves refrigeration power; synchronous motors, cut-out couplings, correct power factor.

"Modernized Humdification Will Aid Textile Mills in Maintaining Profits," G. Fuller. Heating, Piping and Air Conditioning, August, 1933, pp. 304-6. Engineering Publications, Inc., publishers, 1900 Prairie Avenue, Chicago, Ill.

Necessity for and value of humidification in increasing production, quality and profit in textile mills; modern equipment, technique.

"Silica-Gel Plant Air Conditions Chicago Building." Heating and Ventilating, September, 1933, pp. 22-3. Industrial Press, publishers, 148 Lafayette Street, New York City.

Operation of experimental installation in three-story brick residence of Marcus A. Hirschl in Chicago; flow diagram of air conditioning plant; moisture-absorbing effect of gel on humidity.

"Unit Conditioners Heat, Cool and Filter Air in G. E. Building." Heating and Ventilating, September, 1933, pp. 19-21. Industrial Press, publishers, 148 Lafayette Street, New York City.

Description of air conditioning installation of 47-story General Electric Building in New York City.

"Air Conditioning for Comfort and Economy." Modern Power and Engineering, March, 1933, pp. 16, 31-2. Hugh C. MacLean Publishing Company, Ltd., 347 Adelaide Street, West, Toronto 2, Ontario, Canada.

First and operating costs determine practicability of conditioning system: If it cannot pay dividends, it is a liability; factors involved in choosing between three general methods of cooling available.

BREWERIES

"Brewing Process." The Nathan Process. Power Plant Engineering, August, 1933, pp. 340-41. Technical Publishing Company, Monadnock Block, 53 West Jackson Boulevard, Chicago, Ill.

"Refrigeration in Modern Brewery Practice," J. S. Gander. Ice and Cold Storage, August, 1933, pp. 125-31; September, 1933, pp. 147-9. Ice and Cold Storage Pub., 35 Foster Lane, Cheapside, London, E. C. 2.

Compressor types and power plant; electrical vs. steam power; compressor cooling water; outline of brewery operation; ordinary bottling trade; hop storage cold rooms; yeast refrigeration; wort cooling and refrigeration; fermenting rooms.

"New Refrigeration Developments for Brewery," R. S. Wheaton. Ice and Refrigeration, August, 1933, p. 61. Nickerson and Collins, publishers, 435 North Waller Avenue, Chicago, Ill.

New method of building ammonia coils for brine and cooling tank and other improvements; pressure difference between inlet and outlet coil; new automatic method of feeding liquid ammonia into direct expansion coils; new development in room cooling coils.

DIESEL ENGINE FUEL

"Double-Acting Dollars for Diesel Fuel." Power, August, 1933, pp. 419-21. McGraw-Hill Publishing Company, 330 West Forty-second Street, New York City.

Methods of determining how much waste heat is available for specific use and how that heat can be used; summarized from data supplied from over two hundred sources, including manufacturers and users.

ELECTRIC DRIVE

"Belted Motor Drives," R. W. Drake. Southern Lumberman, August 15, 1933, pp. 23-5. J. H. Baird Publishing Company, 150 Fourth Avenue, North, Nashville, Tenn.

Application of leather belts to motor drives; proportionate belt to drive; expedients which will help to increase power of drive: paper pulleys, higher belt speed, wider belts, roller bearings and pivoted motor base and gravity idler.

"Cement Mill Driving," C. H. S. Lupholme. Mechanical World, Sept. 1, 1933, pp. 841-3. Mechanical World Publishers, 31 King Street, West, Manchester 3, England.

Details concerning tube mill driven by 600-hp., 710-kva. motor, complete diagram of connections for electric operation of rotary kiln plant, driving problem resolves itself into devising suitable drive for each machine, while insuring freedom from interference due to stoppage of one unit, and efficiency of drives individually and collectively.

ELECTRIC MOTORS

"Power by Electric Motor," H. M. French, Southern Power Journal, June-July, 1933, pp. 27-9. W. R. C. Smith Publishing Company, Grant Building, Atlanta, Ga.

Motors and control for power plant auxiliary drives; boiler feed pumps; de-aerator pumps; vacuum pumps; forced and induced draft fans; stokers; coal pulverizers; pulverized coal feeders; clinker grinders.

POWER SALES

"Power Sales—Watch Them Grow." Electrical World, May 27, 1933, pp. 664-5. McGraw-Hill Publishing Company, 330 West Forty-second Street, New York City.

"Yardsticks for Power Sales," Dean W. Taylor. Electrical World, Aug. 5, 1933, pp. 179-81. McGraw-Hill Publishing Company, 330 West Forty-second Street, New York City.

PUMPS

"Synchronous Motors for Centrifugal Pump Drives," J. M. Bloomfield. Modern Power and Engineering, March, 1933, pp. 25-6, 38. Hugh C. MacLean Publication Co., Ltd., 347 Adelaide Street, West, Toronto 2, Ontario, Canada.

Class of driving particularly suitable for this type of motor is centrifugal pump whose horsepower required for starting can be reduced by starting in with closed valve on suction side of pump to 30 or 40 per cent rated horsepower.

STEAM POWER PLANTS

"Completion of First Major Step in Modernization Project of Bogalusu Paper Company Demonstrates Marked Savings." Southern Power Journal, June-July, 1933, pp. 8-13. W. R. C. Smith Publishing Company, Grant Building, Atlanta, Ga.

New 1000-hp. gas-fired boiler put in operation; new steam and power generating equipment installed in record time shows savings of $650 a day.

"Power for the New City Hospital at Springfield, Ohio." Power Plant Engineering, August, 1933, pp. 342-5. Technical Publishing Company, Monadnock Block, 53 West Jackson Boulevard, Chicago, Ill.

PLAYING SHERLOCK HOLMES

(*Continued from page 222*)

fruit room hung one of those large old-fashioned carbon lamps. If I'd given him a penny for his thoughts, I would have been entitled to some change.

Small apartments and rooming houses on one meter, homes that rent rooms and furnish electricity to the tenant, give us the most trouble. Now with the great number and variety of appliances in use, almost everybody has something electrical. Where an indulgent landlord pays the electric service bill and there is no way to determine how much is used by each apartment or by the individual roomer, these tenants frequently use all manner of things electrical. They hide them away when they leave their room and when the landlord pays the service bill at the end of the month, he vents his wrath on the power company. He knows he did not use the current and he is probably right, but someone else did use it.

I remember a woman who rented rooms to college students. She had always complained about the size of her bills. She admitted on this occasion that several of the boys had hotplates and did light cooking. She was also certain that this was not the cause because they were so careful and such nice boys. We told her that it was a practise for some students to heat their rooms by leaving plates turned on, especially if the owner of the home was short of coal or trying to economize with heat. She watched for this and found it true.

A small apartment-house owner had a $30 bill for current consumed by hall lights and automatic stoker. Accompanied by the owner our service man found the part-time janitor cooking electrically. Another cause of the high bill was found on the second floor. One of the hall lamps had been removed and in its place was an attachment plug. Our man began looking for a cord that would fit this plug and under a rug at the end of the hall he found an electric heater. As they stood examining it a small boy came out from one of the apartments.

"Is this your heater?" the service man asked.

"Yes," he said, "it's daddy's."

"How much do you use this heater?"

"Oh, when it's cold we use it all the time. Daddy said if they would not furnish heat he was going to get it anyway," the boy answered. At this point his mother appeared and brusquely led him back into their apartment. And so it goes, just one after another and like matrimony, you never know whether you're going to get a prize or surprise.

Time and again one is impressed with the sincerity and apparent justice of the complaint. There seems no question about it. They are not hiding anything, they offer comparisons, they analyze their use, and ask you if it's correct. Well, you don't see anything wrong with their line-up. Yet the meter says they used it. You test the meter and find the same old story. The meter is all right or within two or three per cent of absolute accuracy.

They burned more light than they thought they did. They used some appliance a longer time; somehow, in some way, they consumed it. We may not be able to find out how, but it was not the meter, not once in a thousand.

To a new manager or agent, one of these episodes, a high bill seance with one of the town's prominent citizens, is one of the most unnerving things to his morale that could possibly happen. With his lack of experience, he immediately offers to put in a new meter or put on a check meter. The customer has sold his idea and the employee himself questions the accuracy of the meter. So he spends all his spare time changing meters, or making tests, until he finally comes to a realization of the uncanny dependability of meters in general.

One time our company had an agent who was one of the finest men I ever knew. He had not been promoted very long as manager in a small town before he was stung by this fast meter bug. He became so unstrung and lost his nerve so completely that if a customer complained, he simply read the meter short or paid the difference out of his own pocket. Of course, meters being just like mileage registers, he could not go on this way forever. He became more and more involved, finally ending in disaster. It took the auditors months to straighten out the mess.

Now with so many homes equipped electrically, it's no longer a light bill, it's your "Electric Service Bill". No one can remember and accurately gage their use of current. The meter can. The musician tunes his instrument by a piano, he does not depend upon his memory.

And finally, the more technical and complicated an industry is, the more subject it is to criticism, therefore, the following seems apropos: Oh Lord! in my struggle for a living—and to get one or two grand ahead for myself—teach me not to stick the gaff into the other fellow for I might get some of his, if he gets it.

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CONVENTIONS AND MEETINGS

OCTOBER

15-19 National Electrical Contractors Association, Indianapolis, Ind.
17-19 Association of Iron and Steel Electrical Engineers, Pittsburgh, Pa.
19-20 American Institute of Steel Construction, Stevens Hotel, Chicago, Ill.

NOVEMBER

16-17 National Association of Manufacturers, Waldorf-Astoria Hotel, New York, N. Y.
16-17 Petroleum Electric Power Club, Oklahoma-Biltmore Hotel, Oklahoma City, Okla.

JANUARY

26-28 American Society of Heating and Ventilating Engineers, Detroit, Mich.

RECENT PUBLICATIONS

A number of reports, prepared by committees of the National Electric Light Association prior to their dissolution, were transferred to the Edison Electric Institute by the Liquidating Committee of the N.E.L.A. Because of the value to the industry of the material contained in the reports they have been published by the Institute and may be purchased at the following prices:

Pub. No.		*Price to Members*	*Price to Non-Members*	*Price to Foreign Countries*
	Foreign Systems Coordination Committee			
A13	Power System Wave Shape	$0.20	$0.50	$0.60
	Hydraulic Power Committee			
A18	Economic Design of Hydro-Electric Plants	.20	.50	.60
A19	Hydraulic Governors	.20	.50	.60
	Power Systems Engineering Committee			
A16	Load and Revenue Forecasting	.30	.75	.85
A11	Load Area Development	.30	.75	.85
	Prime Movers Committee			
A4	Burning of Liquid and Gaseous Fuels	.30	.75	.85
A5	Power Station Chemistry	.40	1.00	1.10
A6	Pulverized Fuel	.75	1.85	2.00
A2	Station Piping	.60	1.50	1.60
A7	Stoker Equipment and Furnaces	.60	1.50	1.60
A3	Turbines	.75	1.85	2.00
	Underground Systems Committee			
A9	A-C Network Operation—1931	.20	.50	.60
A10	Cable Operation—1932	.45	1.15	1.25
A14	Current Carrying Capacity of Impregnated Paper Insulated Cable	.25	.65	.85
A12	Fault Locating Methods Used on Underground Cable Systems	.40	1.00	1.10
	Sales Section			
A15	Electric Roasting Ovens	.20	.50	.60
A17	Promotion of Home Air Conditioning	.20	.50	.60
	General			
A1	The Electric Light and Power Industry, 1932	.30	.75	.85

The prices include mailing charges. Member prices apply to employees of company members of the Institute. Please send money order or check with order. Orders should be addressed to—

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The Institute has in stock a limited number of reports prepared by Engineering Committees of the former National Electric Light Association during the past several years. These reports may be ordered from the Institute from the price lists issued by the N.E.L.A., or a new list will be forwarded upon request.